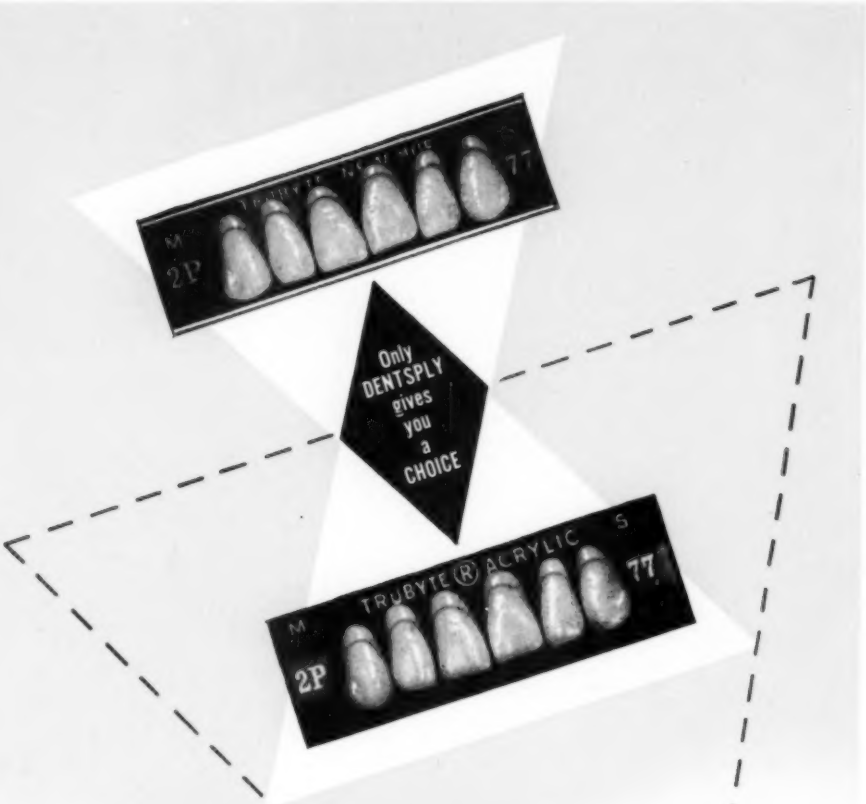
THE Journal OF THE

AMERICAN DENTAL ASSOCIATION

JUNE 1950 • VOLUME 40 • NUMBER 6

MID-CENTURY ISSUE

TABLE OF CONTENTS ON PAGE 643



Only DENTSPLY gives you a CHOICE

of popular forms and shades*

in porcelain and plastic teeth

The best in their Class

TRUBYTE NEW HUE® TEETH

and

TRUBYTE® ACRYLIC TEETH

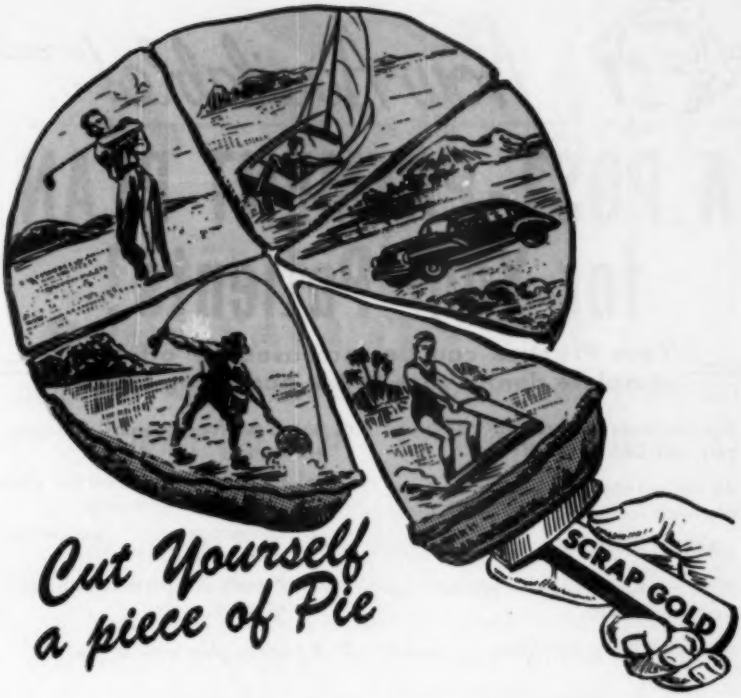
***Trubyte Acrylic Teeth are available in these Trubyte New Hue Shades:**

62, 65, 66, 67, 68, 69, 77 and 81.

THE DENTISTS' SUPPLY COMPANY OF NEW YORK

220 West 42nd Street, New York 18, New York

The Journal of the American Dental Association, Vol. 40, No. 6. Published by the American Dental Association, 222 E. Superior St., Chicago 11, Ill. Yearly subscription $7.00 for U. S. and possessions; $8.00 for foreign countries. Single copy seventy-five cents. Entered as second-class matter, December 31, 1947, at the postoffice at Chicago, Ill., under the act of March 3, 1879. Published monthly. Copyright 1950 by the American Dental Association. The Journal of the American Dental Association is indexed in the Index to Dental Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.



It's Your Vacation Treat . . . and you may choose the portion that looks best to you . . . extra helpings if you wish.

Dee offers a simple and practical suggestion that opens the way to your enjoyment of this well deserved leisure and relaxation.

Check up on that scrap bin of yours . . . that accumulation of old gold and other precious metal scrap . . . inlays, bridges, removables, grindings, polishings, etc.

It has a high cash value. So ship it "as is" to us for reclamation (through your dealer or direct) by the most modern methods of refining. You can bank on it that the last vestige of value will be reclaimed for you and that it will come back promptly in the form of

A CHECK THAT SATISFIES

OFFICE AND PLANT
1900 WEST KINZIE STREET..

HANDY & HARMAN
DEE GOLD
PRECIOUS METALS

REFINERS & MFRS.
..CHICAGO, 22, ILLINOIS

Now Available!

A POST-PAYMENT PLAN for Your Patients!

Your Practice can be increased by offering complete dental care to the budgeting family

1. We purchase your patient's note and pay you CASH, NOW!
2. An ethical plan, easy, convenient and pleasant for both doctor and patient.
3. All forms and service FREE for doctor.
4. FREE insurance feature protects patient and doctor.
5. Annual CPA audit given to doctor.
6. Based on fundamental principles of economics:
   (a) Individually planned for each doctor—no grouping.
   (b) Encourages cash—but permits time payments.
   (c) Permits complete dental care at once.
7. A proven plan now in use.

Reserve Plan Inc

TRADE MARK

922 Walnut Street **Kansas City 6, Missouri**

ASSETS OVER $1,000,000.00

For complete information, mail coupon TODAY!

Reserve Plan Inc. 13-6
922 Walnut St.,
Kansas City 6, Mo.

Please (call on me) (mail me information) about your plan for PURCHASING dental notes. The most convenient time to see me is between the hours of_____ and_____on the following days of the week_____.

No obligation to me, of course!

NAME _____

ADDRESS _____

CITY_____ STATE_____

BOOS SALUTES YOU . . .

and all of those who have contributed to the past 50 years of dental progress

BOOS salutes the progress made by American Dentistry in the past fifty years, progress marked by the increased scope of dental service as well as by greatly advanced and perfected dental technics. BOOS is proud to have played its part, for 48 of the past 50 years, in providing restorations that meet the most exacting requirements of discriminating dentists throughout the United States.

The leadership BOOS has obtained in the field of dental prosthesis is in large measure due to intelligent application of new technics, new processing methods and materials, as they are developed, to provide dentists and their patients with restorations of greatly improved function, appearance, and serviceability. At this mid-century point BOOS is proud to salute those who have contributed so much to the progress of Dentistry, and pledges itself to keep pace with the new developments of Dentistry in the next half-century.

HENRY P. BOOS DENTAL LABORATORIES, Inc.

808 NICOLLET AVENUE • MINNEAPOLIS 2, MINN.

Branch Laboratories: Medical Arts Bldg., Duluth, Minnesota—Equitable Bldg., Des Moines, Iowa

ESTABLISHED 1902

What year's literature are you using in 1950?

When you have a moment, look at the title pages of some of the books you are using now. What year were they published?

☆ ☆ ☆

In marking the mid-point of the Twentieth Century, the dental profession can take justifiable pride in the advances it has made to put it on a sound, scientific foundation.

During most of these fifty years (since 1906) The Mosby Company has dedicated its efforts to progress and improvement in the Dental Literature, and will continue to do so.

The year 1950 will see the publication of many more outstanding dental books—manuscripts from authorities in the dental world—especially planned for the protection of *your* practice and *your* patients. How many of the New Mosby Dental Books will you be using during the year?

☆ ☆ ☆

Keep informed with Good Books!

Write for information on Mosby Books and Journals—our Mail Department will be happy to be of service.

THE C. V. MOSBY COMPANY

SCIENTIFIC PUBLICATIONS

3207 Washington Blvd.
St. Louis 3, Missouri

720 Post Street
San Francisco 9, California

HERE IS
THE PROOF

Before Use:
Crystal Filter is pure white

After Use:
Filter turns dark as it traps nicotine and tars

Helps protect the teeth and gums!

The nicotine and tars trapped by the Denicotea crystal filter *can't reach* the oral cavity. Cigarette stain and gum irritation are thus effectively reduced.

PROFESSIONAL INTRODUCTORY OFFER:
Write for Denicotea holder, $1.00 postpaid, *(regular price $2).*
Lady Denicotea, $1.75 *(regular price $3.50).*

dunhill **DE·NICOTEA**
Crystal Filter Cigarette Holder
Alfred Dunhill, Dept.D, 660 Fifth Ave., N. Y. 19

THE
MEDICAL
PROTECTIVE
COMPANY
FORT WAYNE,
INDIANA

Professional Protection
Exclusively
since 1899

DENTISTS

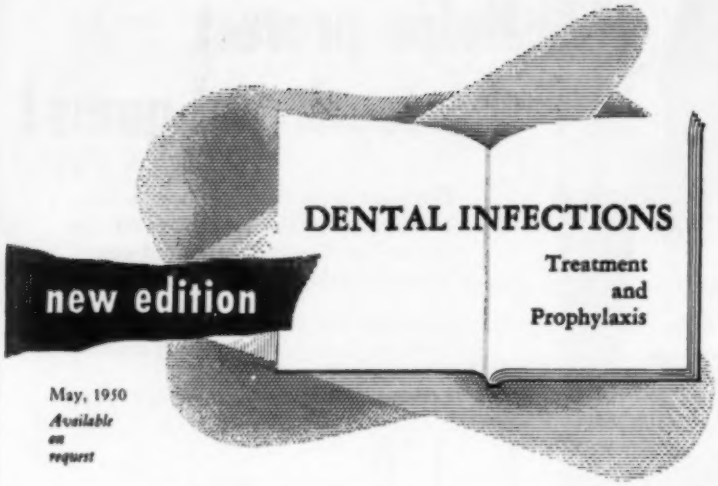
AUTO DISPLAY PLATES

Made of steel; enamel finish. Glossy, durable. Green Caduceus, lettering and border on White field. Size 2¾" x 4¾".

Price: $3.00 Per Pair, postpaid

Satisfaction guaranteed or money cheerfully refunded!

Send today to
CROSS EMBLEM CO.
11 W. 42nd St. (Dept. AD 65)
New York 18, N.Y.



May, 1950
Available on request

Completely revised to encompass the latest advances in therapy, this definitive leaflet discusses:

DENTAL INFECTIONS
- Vincent's Stomatitis
- Acute Pericoronitis
- Osteomyelitis
- Periodontitis (Pyorrhea)
- Gangrenous Stomatitis
- Maxillary Sinus Infections and related infections

DENTAL PROPHYLAXIS
- Bacteremia
- Diabetes Mellitus
- Periodontitis (Gingivectomy)
- Fractures and others

ORAL MANIFESTATIONS OF SYSTEMIC INFECTION
- Syphilis
- Tuberculosis
- Pemphigus
- Erythema Multiforme
- Erysipelas and other symptoms

SQUIBB PENICILLIN PRODUCTS

SQUIBB STREPTOMYCIN PRODUCTS

SQUIBB NUTRITIONAL PRODUCTS

To get this brochure . . .
This leaflet will be sent to you if you will drop a card to the Professional Service Department, E. R. Squibb & Sons, 745 Fifth Avenue, New York 22, N. Y.

SQUIBB

***FRONT*—SUPER-ABSORBENT CELLULOSE**

Look first at the light colored front. See why DENTA-TOWELS are so soft, so highly absorbent.

***BACK*—IMPROVED PLASTIC COATING**

The darker, coated side used toward the patient is water repellent. New process makes DENTA-TOWELS STRONGER—MORE PLIABLE—LINT FREE.

DENTA-TOWELS are RIGHT no matter how you look at them. Less expensive than any other towel on the market. Cost half what your laundry service costs. The quality is RIGHT, too! They proved far stronger under actual "clip pull" tests. Yet DENTA-TOWELS are softer and more pliable than most towels. Sized right for professional use—14" x 17". See for yourself! DENTA-TOWELS give you more for your money. If your dealer doesn't have a supply, write TODAY for free samples and prices . . . Dental Products Division, WARD PAPER CO., Merrill, Wisconsin.

DENTA-DISCS—Instrument tray covers. 13½" diameter. Approved weight. Clean—Disposable—Non-reflecting cream color—Absorbent—Skid resistant.

DISPOSABLE

DENTA-TOWELS

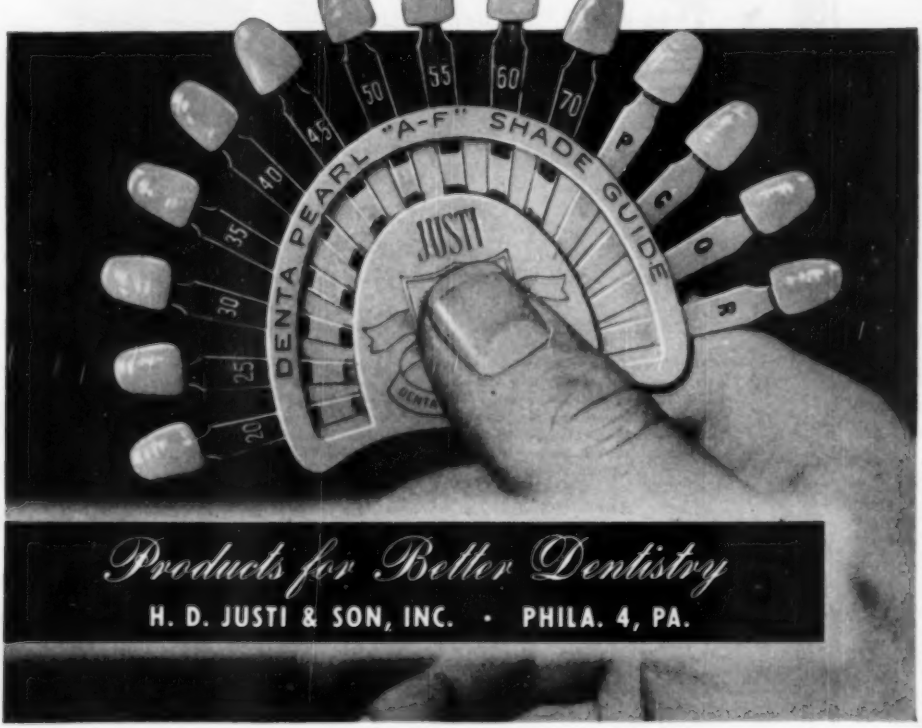
Justi-Tone

CERTIFIED TO MEET A.D.A. SPECIFICATIONS

T-3

NEW TRI-CHROMATIC DENTURE BASE SHADES

A • B • C

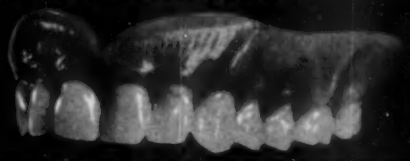


Products for Better Dentistry

H. D. JUSTI & SON, INC. • PHILA. 4, PA.

HARMO
OR
CONTRA
as simple as
A . . . . . B . . .

THE "AGE-FREQUENCY" DENTURE



for maximum esthetics through harmonious blending of versatile Dento Pearl teeth and T-3 Tri-Chromatic Denture Base shades.

Now you can have both — harmony or contrast between denture teeth and base — and with just one denture material.

Justi-Tone T-3 — a reliable, time-tested, ADA approved denture base — is made in Tri-Chromatic shades A, B and C. These three distinct shades of pink offer the opportunity of perfect harmony or extreme contrast . . . and even permit the most subtle and delicate color variations in between.

Take advantage of this new esthetic service and write harmony or contrast in your denture prescriptions with T-3 Tri-Chromatic shades. It's just as simple as A. B. C.

Ask your laboratory to show you samples of harmony and contrast — or fill in coupon below.

H. D. JUSTI & SON, INC.
32nd & Spring Garden Sts., Phila. 4, Pa.

Please send me, without charge, samples of Justi-Tone T-3's new Tri-Chromatic shades.

Dr. .....

Address .....

City ..... State .....

Dealer .....

Laboratory .....

JUSTI

Just off the press

366 pages of indexed articles from 144 dental journals

Looking for a particular dental article? Or a number of references on dental subjects? You'll find them quickly and easily in this complete, comprehensive Index. It lists thousands of articles from all of the important journals published in the English language from 1945 through 1947. Australia, Canada, England, India, New Zealand, South Africa and the United States are covered. Authors and Subjects are given and cross-indexed for convenience. In addition, you'll find lists of dental texts and journals. Original articles, editorials, abstracts, papers discussed before Societies . . . *all* are here. Don't waste time looking for the proverbial needle in a haystack. Order your copy of this valuable Index. Only a limited edition was printed—so to make sure you get a copy, write today.

A valuable reference for Dentists, Dental Manufacturers, Pharmaceutical Manufacturers, and Libraries.

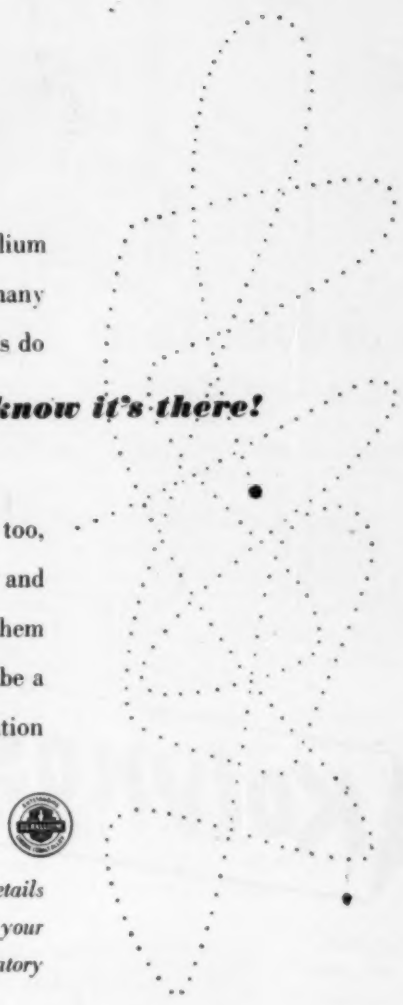
Only $10. *Order your copy today!*

American Dental Association, 222 East Superior Street, Chicago 11, Illinois

If you wear a Durallium
appliance, doctor . . . as so many
prominent dentists do

you scarcely know it's there!

Your patients, too,
appreciate the comfort and
efficiency you prescribe for them
when you prescribe a
Durallium restoration



Write for details
on Durallium, or ask your
Durallium laboratory

durallium

products corp.

809 WEST WASHINGTON BLVD.
CHICAGO 7, ILLINOIS

—Cleans—Quickly, Efficiently

—Cool, Minty Flavor

—Leaves the Mouth Feeling Clean and Refreshed

—Recommended and Used for Years by Discriminating Dentists, all over the World

—Samples on request

WHITEHALL PHARMACAL COMPANY • 22 East 40th Street, New York 16, N. Y.

These prevent toothache, too

MAKE PERIAPICAL EXAMINATION . . . FOLLOW WITH BITE-WING STUDIES

twice a year for children . . . once a year for average adults

Your patients all know about "new-type" dentifrices designed to prevent tooth decay. Make sure they also know about modern methods of dental x-ray examination that locate cavities undisclosed by explorer and mirror.

You can do this—easily—by making sure they read the 12-page Kodak booklet, "How to Prevent Toothache," by Howard R. Raper, D.D.S.* Do this and you'll serve your patients better . . . detect and fill up to 40% more cavities . . . save them from toothache.

In addition to Periapical Films for the apical areas and Bite-Wing Film for interproximal examinations, Kodak offers Occlusal Film for the occlusal aspect, Blue Brand Film for extraoral studies . . . *an appropriate film for every phase of dentistry.*

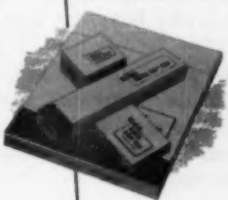
For sharp, bright radiographs ...the Kodak Film-Chemical Combination

1. Use Kodak X-ray Films—Kodak Bite-Wing . . . Kodak Periapical . . . Kodak Occlusal . . . Kodak Blue Brand. Made to help the dentist know *more*, do *more*. Kept fresh in hermetically sealed foil packages.

2. Use Kodak Concentrated Processing Chemicals—Kodak Concentrated Dental X-ray Developer . . . Kodak Concentrated Dental X-ray Fixer. Tested ingredients, compounded with laboratory care.

So, for best results, always use Kodak Film and process it in Kodak Chemicals. Remember—order *together* (through your regular dental dealer) . . . use *together* . . . because they are made to work *together.*

Other Kodak X-ray Products for Dentists: Film Chest, Dispenser, Receptacle . . . Exposure Holders . . . Intensifying Screens . . . Safelight Lamps and Filters . . . Processing Tanks . . . Processing Hangers . . . Thermometer . . . Mounts . . . Film Corner Cutter . . . Illuminator.



**More than 1,000,000 copies have been distributed. First 50 copies, free—additional copies, $1 per 100.*

Eastman Kodak Company
X-RAY DIVISION
Rochester 4, N. Y.

Kodak
TRADE-MARK

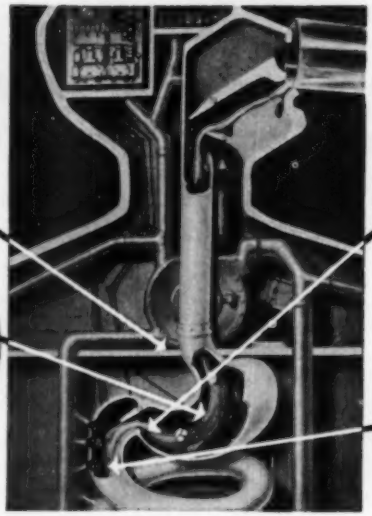
Give faster pain relief with BUFFERIN

ACTS TWICE AS FAST AS ASPIRIN

WITHOUT GASTRIC DISTRESS!

1. BUFFERIN enters the stomach here.

2. BUFFERIN exerts its antacid effect, lessening the possibility of gastric distress.



3. BUFFERIN helps dilate the pyloric valve, promptly leaves the stomach.

4. BUFFERIN's analgesic component is absorbed into the blood *twice as fast as aspirin,* relieves pain.

When you prescribe BUFFERIN to your patients you assure *faster relief of pain.* Clinical studies[1] show that within ten minutes after BUFFERIN is ingested, blood salicylate levels are as great as those attained by aspirin in twice this time. That is why BUFFERIN *acts twice as fast as aspirin.*

BUFFERIN has *greater gastric tolerance.* BUFFERIN's antacid ingredients provide protection against the gastric distress so often seen with aspirin.[1] BUFFERIN, therefore, is especially suited for use when prolonged use of salicylates is indicated.

1. Effect of Buffering Agents on Absorption of Acetylsalicylic Acid. J. Am. Pharm. A., Sc. Ed. 39:21, Jan. 1950.

In vials of 12 and 36 and bottles of 100. Scored for divided dosage. Each BUFFERIN tablet contains 5 grains of acetylsalicylic acid with optimal proportions of magnesium carbonate and aluminum glycinate.

BUFFERIN
is a trade-mark of the Bristol-Myers Company

Accepted COUNCIL ON DENTAL THERAPEUTICS AMERICAN DENTAL ASSOCIATION

A product of BRISTOL-MYERS COMPANY
19 West 50 St., New York 20, N. Y.

THE 1951 A. D. A. APPOINTMENT BOOK

WILL BE AVAILABLE JULY 1st

If you aren't already on the standing order list, send in your order today.

EXCLUSIVE FEATURES

- ★ **A full week's appointments at a glance**
- ★ **Patient recall system**
- ★ **Catalog of library books**
- ★ **Catalog of dental health educational literature**
- ★ **National holidays**
- ★ **List of acceptable local anesthetics**
- ★ **List of certified dental materials**

Use This Order Blank

American Dental Association
222 E. Superior Street
Chicago 11, Illinois

Check the order you wish to place:

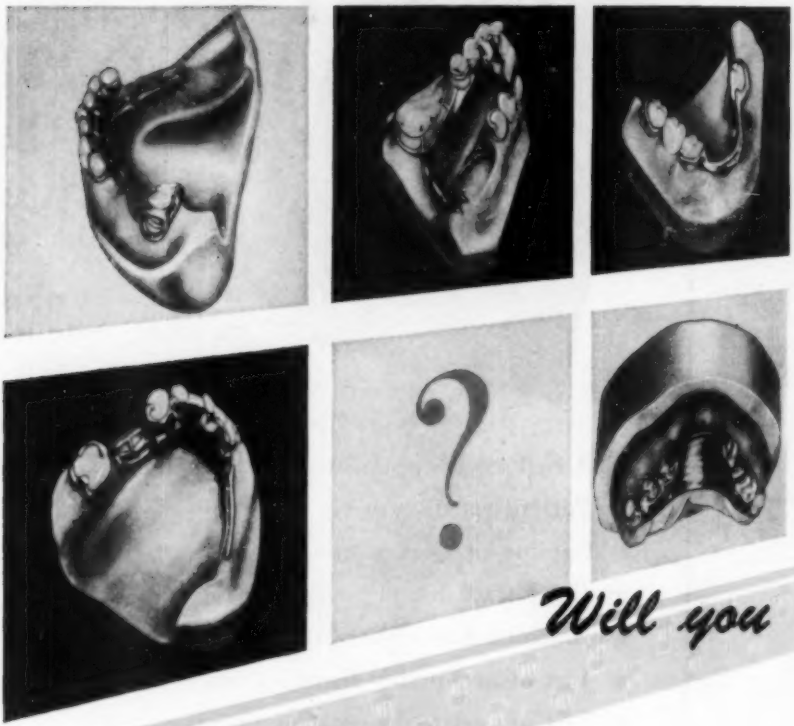
☐ Place my name on the standing order list to get the A.D.A. Appointment Book regularly each year beginning with the 1951 edition and bill me for $1.50. I understand this order is cancellable at any time.

☐ Just send me a copy of the 1951 book and bill me for $1.50.

Signed .....

..... No. Street

..... City Zone State

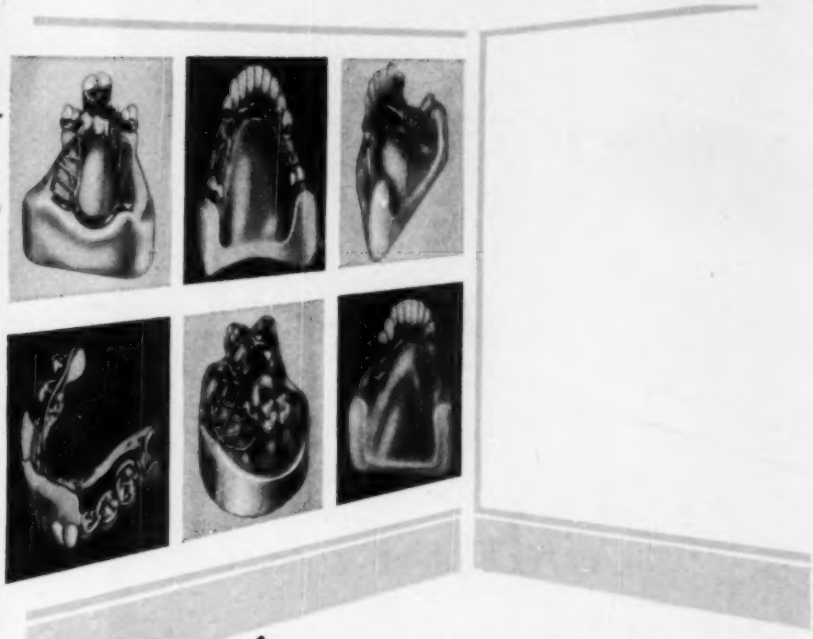


Born of Research
Proved by Test

NEY GOLDS

NEY-ORO & PALINEY CASTING GOLDS ◎ ZEPHYR PLATE, SHELLS & FOIL ◎
NEY ROD SOLDERS ◎ THE NEY SURVEYOR ◎ THE WAXING DIE ◎

3NY30



supply the missing picture ?

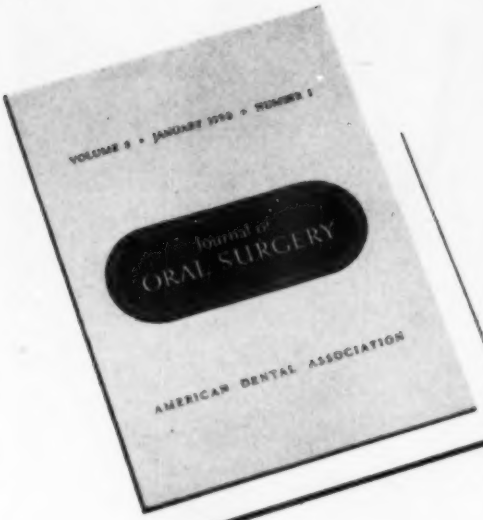
These cases from our picture 'gallery' are typical of the "tough" ones that keep coming in to our Technical Department for study and advice. We are proud of the fact that many of them turn out to be successful solutions to "impossible" design problems.

Perhaps you have not realized that this Ney service is free and available to you at all times. We offer a broad background of practical laboratory experience plus our specialized partial denture design know-how resulting from 30 years of work in this field.

Please look on this as your standing invitation to use the design and consultation service of our Technical Department. Your problem cases are always welcome at Ney's.

THE J. M. NEY COMPANY • HARTFORD 1, CONNECTICUT

NEY-ORO ELASTIC & PALINEY WIRES • NARRO-STRIP SOLDERS •
THE NEY WING BAR AND FINISH LINE CLIPS • DENTURE-CLASP WIRE



Written and edited for you

Whether you have a general practitioner's interest in oral surgery or specialize in this important field of dentistry . . . the JOURNAL of ORAL SURGERY is for YOU. It is packed with practical articles you'll find invaluable. It is concerned with theory and practice, with case reports, with answers to your queries, with reviews and recommendations you'll find helpful. Edited by Reed O. Dingman, MD, DDS, this informative, well-illustrated Quarterly Publication of the American Dental Association will keep you posted on all that's new and worthy of your attention. Recently redesigned from cover to cover, the new format, new large-size, easy-to-read type and many photographs, drawings and charts, add immeasurably to your interest. Don't miss another issue.

Send in your subscription today. Only $5 per year.

American Dental Association
222 East Superior Street, Chicago 11, Illinois

A LAXATIVE FOR *judicious* THERAPY

because of its

Broad Clinical Acceptance

Phospho-Soda (Fleet)'s* wide acceptance by physicians everywhere is a tribute to its prompt, gentle laxative action—thorough, but free from disturbing side effects. Leading modern clinicians attest its safety and dependability as a pre-eminent saline eliminant for judicious relief of constipation. Liberal office samples on request.

* Phospho-Soda (Fleet) is a solution containing in each 100 cc. sodium biphosphate 48 Gm. and sodium phosphate 18 Gm. Both 'Phospho-Soda' and 'Fleet' are registered trade marks of C. B. Fleet Company, Inc.

C. B. FLEET CO., INC. • LYNCHBURG, VIRGINIA

ACCEPTED FOR ADVERTISING BY THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

No wonder you experience a thrill of satisfaction as the case goes smoothly and snugly to place! A glow of pride, too, in the patient's pleased reaction to its comfortable fit. And subconsciously, perhaps, a feeling of relief that your painstaking care in the preparation of the case was not set at naught by processing factors beyond your control.

But you'll learn to take this precision fit for granted as you go on using REPLICAST removable appliances. Each step in the Dresch-developed REPLICAST technic is carried out with testing-laboratory precision; the "variables" of customary casting procedures are eliminated. Yet because this very circumstance makes for greater efficiency in production, the cost to you is no greater—in fact, may be even less.

You will find welcome relief from pre-insertion worries in the regular use of these supremely accurate appliances. Mail the coupon or write for further particulars now.

REPLICAST ...A METHOD... NOT A MATERIAL

The Dresch Laboratories Company
1009 Jackson Street—Toledo 1, Ohio

Tell me more about 'REPLICAST' precision removables.

Dr._____

*Street Address*_____

*City—Zone—State*_____

160

A HALF-CENTURY OF SERVICE

50th Anniversary Year

CRESCENT DENTAL MFG. CO.

1839 South Pulaski Road, Chicago 23, Illinois

—and hundreds of other quality products
for dentists and laboratories

the basis for a fine impression

KonOral is formulated to give you all the working qualities essential to fine impressions.

KonOral
- contains no Zinc Oxide or Eugenol
- can be used with any technique, in any type of tray
- has natural affinity for tissue
- starts setting after tray is seated
- flows beyond limits of tray
- can be added to and returned to mouth

☐ Send one Introductory Package of KonOral (6 to 9 impressions) ..... @ $2.00

☐ Send one Standard Package of KonOral (12 to 18 impressions) ..... @ $3.25

through

Dealer .....

City .....

Dr. .....

Street .....

City .....

State .....

KONFORMAX DIVISION, PERMATEX COMPANY, INC., BROOKLYN 22, N. Y.

THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

JUNE 1950 • VOLUME 40 • NUMBER 6

CONTENTS

This First Half Century 644

Advances in Dental Science *Robinson* 647
- Research *Robinson, Dunning, Blayney, Blackerby, Hodge, Appleton, Brodie* 648
- Diagnosis and Treatment Planning *Ennis, Simpson, Bernier* 654
- Dental Health and Systemic Disease *Stafne, Hatton, Burket, Kerr, Mann* 656
- Basic Sciences *Kitchin, Fosdick, Bibby, Cahn, Paffenbarger, Hill* 661
- Preventive Dentistry *Baume* and *Becks, Ostrander, Thomas* 666
- Oral Surgery *Thoma* 670
- Restorative Dentistry *Arnim, Keys, Tylman, Elliott, Boucher* 673

Advances in Dental Education and Licensure *Horner* 687
- Fifty Years of Progress *Horner* 688
- Admission to Dental Study *Peterson* 692
- Dental Education *Hine* 696
- Dental Teachers and Their Preparation *Blauch* 701
- Auxiliary Dental Personnel *Robinson* 703
- National Board of Dental Examiners *Wright* 709

Notable Contributors to Fifty Years of Progress 711

Advances in Social Responsibility *Noyes* 742
- Dentistry and the Legislative Process *Garvey* 744
- Dental Public Health *Gerrie* 750
- Dentistry Recognizes Its Responsibility to the Public *Noyes* 760

Advances in Dental Literature *Foley* 769
- Periodical Literature *Foley, McCrae* 770
- Book Literature *Denton* 783
- Use of the Literature *Foley* 788

This first half century . . .

saw dentistry come to maturity as an essential agency of the nation's health service. It also saw many other things during its troubled fifty years. The atom split for the first time at the command of man. The radio grew up mechanically if in no other way. There were a couple of world wars. The country went in for a record-breaking prosperity and then promptly matched it with a record-breaking depression. Television began its assault on what was left of the senses, and life at all levels seemed to become louder, more complicated, more enheartening, more frightening and more headlong.

Some day, some historian may get enough perspective on this first half of the twentieth century to determine whether what happened should be called progress or something less than that. At the moment of mid-century, the important job seems not to be evaluation, but survival.

Dentistry, in those first five decades, did not withstand—nor did it wish to withstand—the impact of the changes which had been going on about it. Dentistry moved with these forces or against them in attempting to fulfil its mission in the nation's health service. This effort is the story of this special MID-CENTURY ISSUE of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. No reader of it can help being impressed by the velocity and character of the changes in the half century even when they are summarized briefly as in this issue. If he is a thoughtful reader, he will recognize the advances that have been made no less than the challenges which yet remain in work to be done, in problems to be solved.

The historian of the future may find that the greatest influence on dentistry in the first half of the 1900's was the increasing interest in, and productivity of, research. No field of dentistry was left untouched by it. The early emphasis on technology gave way to the recognition that all of the sciences had something vital to contribute to the work of dental investigation. Many advances were made, and the fact that many final answers are still elusive need not be of particular concern so long as the will to scientific inquiry does not flag.

The task of the next half century will be to enlarge the support for dental research, to develop greater opportunities for training a larger number of qualified research workers and for expanding inquiry into areas of dentistry not yet significantly attacked by orderly and scientific investigation.

In dental education also, progress has been significant. The dental schools were matured by their participation in university life; standards were raised and codified by a sound program of accreditation; integration with other disciplines was improved; an increasing number of qualified applicants was attracted to the study of dentistry and the profession began to examine its responsibility for the training of auxiliary dental personnel. The need for greater opportunities in graduate and postgraduate education was more fully exposed, and a program for the recognition of specialties in dentistry was initiated.

These achievements, while great, must be the basis of a permanent dissatisfaction with any current program of dental education, for no profession can widen its horizon if it is not endlessly seeking better methods of training those who enter and practice it.

Dental education at mid-century needs support commensurate with

the social responsibilities that have been placed upon it. The teaching staff must be enlarged and improved. Present methods in dental education must be analyzed in terms of the newer roles in which the dentist is being asked to serve. The scientific content of dental education must not be allowed to throw into heavy shadow the cultural and humanistic influences without which true professional stature is never attained.

The recognition of dentistry's essential part in public health must also be counted among the impressive achievements of the half century. Never were so many forces at work to bring an awareness of the value of dental health to so many people. Never were so many weapons at hand for the prevention and control of dental diseases. Never was there such promise as can be found in the sustained effort to develop dental programs which meet increasingly the needs of a community or state.

This progress has not been without its new dangers for there are those who are willing to exploit it in their own self-interest. The threats of political control and intervention, of interference in doing a professional job under principles traditional to the professions remain as major barriers for the second half of the century. These barriers can grow no larger if the health of the nation, and not some subsidiary objective, remains the major goal of dentistry and the other of the health professions.

The first half of the century has seen a remarkable growth in the organization and unity of the dental profession. Few communities and fewer states lack the instrumentality of an organized dental group which can be the motivating factor in providing a better distribution of the benefits of dental health. The task now is to put this instrumentality to work. Dental societies must exercise their professional leadership, develop their cooperation with all groups that have an interest in the health of the patient and integrate these elements into a program consistent with the needs and the traditions of their communities.

The historian of this half century will also discover other factors that should not be overlooked: the continuing preeminence of American dentistry in technological progress; the steady search for enduring relations with the biologic sciences; the good growth of professional literature; the awareness that dental health is never more than a part of the totality of health; the recognition of social responsibility in the practice of the profession; and the will to solve new problems which has made dentistry one of the sturdiest, though one of the youngest, professions.

Advances in

DENTAL SCIENCE

Hamilton B. G. Robinson, D.D.S., M.S.
Columbus, Ohio
Editor

1900 • 1950

TO STAND at one of the minute points in the vast dimensions of time and review the advances of a half century is almost as difficult as reproducing the changing patterns seen in a rapidly revolving kaleidoscope. For purposes of review it is necessary to subdivide, but when the fields of dental art and science are broken down into subheadings much of the thrill of the total pattern is lost.

It might be well simply to review one small area such as that embracing the evolution of filling materials and technics—from the early castings of Taggart, through the development of chemists, physicists and dentists, to the precision gold work of today or the use of porcelain, silicate cements and resins as esthetic filling materials. Again, a thrilling romance could be recorded from the mention of mottled "denti di chiaie" by Eager, in 1902, and McKay and Black's exacting description of mottled enamel, through Churchill's and Smith's independent demonstrations of fluorine as the cause of mottling, along Dean and his co-workers' epidemiological studies, past the suggestions and observations of fluorides as caries inhibitors to the broad applications of topical fluorides and fluorides in communal water supplies. Here the role of

dentists in defining the problem, the use of the pure sciences as developers and crystallizers and the application of the discoveries to dentistry, a derivative science, can be demonstrated beautifully.

Names might be passed in review, from such giants as G. V. Black and W. D. Miller of the early years of this century, who worked more or less independently, to the modern dental scientists who usually work in groups at universities and research institutes. The modern dental research group uses the pure scientists in the fields of chemistry, physics, biology and mathematics, as well as the anatomists, biochemists, bacteriologists, physiologists and pathologists in the derivative scientific fields, for co-workers and consultants. While a few independent investigators remain, their effectiveness is becoming lessened as science is increasingly more highly organized and specialized.

Instruments, materials and methods that have been devised in the past 50 years are numerous and they could be tabulated to record landmarks: the x-ray machine, the casting machine, intermaxillary wiring, procaine, resins, hydrocolloids, histochemistry, the electron microscope, balanced alloys, extraskeletal splints, diamond stones, salivary lactobacillus counts, silver points, cephalometric measurements, fluorides, electrosurgical knives, airblast and radioactive isotopes.

Perhaps a group of the dentists and dental scientists who helped to make the history of the past half century can best write the history of each of their fields. Here they briefly sketch a few high points and a few developments and make a few predictions.

ADVANCES IN RESEARCH

Interest and Support

There has long been a curiosity among a few dentists which has led to investigations. In the early years of the century most dentists looked on these investigators as "peculiar." It is true that dentistry was often prompt to use the results of their studies when they could be applied clinically. However, real moral support and financial backing were lacking. Dental schools had little or no money to invest in research, philanthropists were attracted by more spectacular fields and the government had not entered the business of supporting scientific research to any degree.

Dental research, for obvious reasons, was of a materialistic sort in its earlier days. Description, observation and technologic development preceded the more scientific approach. Just because the earlier years of the century were devoted to this type of research is no reason that we should look down upon the pioneers of those days or the works which they hewed out of the raw material.

In the thirties dental research received more financial and human support. A few philanthropic individuals and funds were attracted to the aid of investigators in the oral field. Wisely, much of this effort was devoted to training of dentists in scientific fields. In the forties, when "research" became a common word and a respected calling, dentistry was infinitely better prepared to accept its responsibilities than it would have been without the handful of fellows trained in the previous decade. When the stimulus of the war and the atomic development showed, in broad relief, the importance of science, dentistry was in a position to utilize funds given through governmental agencies.—*H. B. G. Robinson, D.D.S., M.S.*

Progress in dental research. President Truman signs dental research bill authorizing $2,000,000 for dental research building and $750,000 annually for dental research, June 24, 1948. Inset: The Research Institute of the National Dental Association, Cleveland, established February 7, 1916, but later discontinued

Government in Dental Research

It is surprising to realize that only since World War II has any general governmental participation in dental research taken place. In 1946 the U.S. Public Health Service authorized its first grants-in-aid to outside agencies and the Army became interested about the same time. Large scale Navy participation began in 1947 with the establishment of the dental branch of the Office of Naval Research and the Veterans Administration followed in 1948. The year 1947 perhaps marks the turning point, for then it was that the Navy first asked the National Research Council for advice on military dental standards. This led to the formation of the Dental Advisory Committee of the National Research Council, which is now the clearinghouse not only for intramural research problems arising within the Services but also for approval of applications for grants-in-aid made from all over the country. With this new approach to dental research on the part of government agencies came large financial expansion and intellectual expansion. In reaching beyond the immediate problems of their own Services and utilizing civilian facilities all over the country, they opened the way for basic research in the dental field. In the fiscal year 1949-50 the U. S. Public Health Service made $235,000 available for extramural research projects and fellowships. The Navy came next with $110,000. The Army, the Air Forces and the Veterans' Administration had emergent programs. The Atomic Energy Commission was just entering the field.

Intramural research on a smaller scale among government agencies is, of course, much older. The first project to attract national attention was the venture of the National Bureau of Standards into the field of the testing of dental materials. This work started in 1919 and was not supported by the American Dental Association until almost ten years later. Pio-

neered by George C. Paffenbarger, it has standardized dental operating methods as well as dental supplies throughout the country and was one of the major advances achieved in the field of clinical dentistry during the 1920's.

The next important government research project to attract attention was the epidemiologic work of H. Trendley Dean, of the Public Health Service, on dental fluorosis and the influence of water-borne fluorine upon dental caries. Epidemiologists all over the country know of this work and are proud of it. It has led to the experimental fluoridization of water supplies now being carried on in many cities and to the topical application of fluoride to the teeth, now a major subject for study and demonstration by the U. S. Public Health Service.—*James M. Dunning, D.D.S.*

Dental Societies and Research

During the first half of the twentieth century the dental profession has accomplished much in the field of research. At the beginning of this century only a very few dentists were interested in fundamental investigation regarding oral disease and dental societies were scarcely interested in nontechnical reports. Today, all dental societies lend their moral, if not active, support to all types of original study.

The National Dental Association (now the American Dental Association) was the first dental society in the United States to develop and provide financial support for research programs. In 1908 the association appointed a permanent committee on scientific research. The Research Commission was formulated by the association in 1913. These two groups, acting under the authority of the parent body, employed or subsidized investigators for the study of dental problems. Through the activity of the Research Commission, the Research Institute was opened in Cleveland, Ohio, in 1916. The institute plan was abolished in 1920 in favor of providing grants-in-aid to dental schools or private laboratories, and fellowships for the training of research personnel. The American Dental Association can well be proud of its significant contribution for the welfare of society.

The International Association for Dental Research has provided, without doubt, the greatest stimulation and interest for the development of research which deals with all phases of dental problems. This association was founded in 1920 with a nucleus of 25 charter members. Now in its thirtieth year, the International Association for Dental Research has a membership of 614. One of the requirements for membership is the publication of at least one report of meritorious original research. This association is divided into 33 local (geographic) sections of five or more members. Each section conducts meetings throughout the year. The International Association for Dental Research holds an annual meeting of two and a half days' duration at which time more than 100 scientific reports are presented. In recent years the attendance of members and guests has averaged over 250.

The American College of Dentists has supported dental research by means of grants-in-aid, beginning in 1940 and carrying through until establishment of government grant-in-aid programs in 1947.

Many state and local societies actively contribute to and encourage dental research by the public recognition of meritorious achievements by research workers. Notable among these are the following: (1) the John R. Callahan award given by the Callahan Memorial Commission of the Ohio State Dental Society in recognition of the high merit of scientific contributions made to humanity and the healing professions; (2) the Jarvie medal and the Benjamin Lord prize given by the Dental Society of the State of New York; (3) the Morris L. Chaim prize

given by the First District Dental Society of New York; (4) the Newell Sill Jenkins medal awarded by the Connecticut State Dental Society; (5) the prize essay contest of the Chicago Dental Society; (6) the American Dental Association honorary award; (7) the Fauchard medal given by the Pierre Fauchard Academy; (8) the William J. Gies achievement award in research given by the American College of Dentists.

Some state dental societies have sponsored and financed research projects such as the Minnesota Dental Foundation and the California State Dental Foundation. Within the last two decades the development of dental specialties has been rapid. These specialty groups have organized themselves as academies and as such, each has materially encouraged investigation regarding problems within its area.—*J. Roy Blayney, D.D.S., M.S.*

Research and Schools

The research done prior to the beginning of the twentieth century was limited and of little consequence, except so far as it related to improvement in the materials and technics of operative and prosthetic dentistry.[127] Interest in the causes of oral diseases and means for their prevention had been largely lacking, and even up to the time of Gies's monumental report on dental education, in 1926, the dental schools continued to devote their attention primarily to "new appliances, implements and operative procedures." As Gies said at that time,

> . . . with notable exceptions (dentistry) has been so well satisfied to meet, remedially, conditions as they are in the individual, today, that the profession in general is failing to acquire the knowledge that might give it power, by prevention, to serve all humanity tomorrow.[128]

Year by year, a steadily growing number of well prepared investigators in our dental schools have begun delving into the basic problems of dentistry, and showing increasing awareness of the fact that "the need for thorough research into the causes of oral disease and into the problem of the promotion of oral health is universal and compelling."[170] All of the 38 dental schools studied by the American Dental Association's Council on Dental Education in 1942-1943 indicated that they had research programs in operation,[62] in contrast to the situation during the early 1920's when only 9 of 46 schools reported any research activity.[63]

Although gaining strength, dental research still is circumscribed by the narrow limits of its financial resources, as evidenced by the fact that, in 1947, an estimated $1,000,000 was expended for research in dentistry, while $110,000,000 was made available for the support of medical research.[128] "Hardly half of the dental schools in the United States today have the atmosphere, the facilities, and the funds with which to couple teaching and research,"[220] but there are encouraging signs that:

> Increased interest, opportunities and assurance of support are today providing the means of expansion in the relatively undeveloped field of basic research in the diseases of the mouth. That these opportunities are being utilized is evidenced by a gradual increase in the quantity and quality of basic studies being conducted.[128]

Dental research holds great promise for the future, for now, at last, there is recognition by dentistry and her allied sciences, and by the public as well, that "the fruits of inquiry are essential foods for the proper nourishment and full growth of a profession . . ."[163] and that "no dental school fulfils its mission unless the spirit of research permeates the activity of both teachers and students. . . ."[170, 220] The dental school of today is endeavoring to make its contribution to research, and through research, to the improvement of its teaching program.—*Philip E. Blackerby, D.D.S., M.S.P.H.*

Research activities of 5th decade of 20th century compared with those of last decade of 19th century

Teeth	Oral and systemic environment	Problems of practice
Some research technics of the 1890's		
Microscope Histology (Broomell[88]) Pathology (Williams[476]) Measurement (Wedelstaedt[472]) Physical properties (Black[90])	Descriptive bacteriology (Williams[478]) Clinical observation Pyorrhea (Talbot[426]) Diet (Kirk[288]) Movement (Ottolengui[329])	The x-ray (Morton[312]) Malocclusion (Andrews[9]) Cataphoresis (Price[313]) Cavity preparation and fillings (Johnson[240])
Some research technics of the 1940's		
Radioisotopes[397] Chemical analyses[183] Electron microscopy[331] Experimental nutrition[301] Experimental histology[89, 100] Light scattering[395] X-ray absorption[471] Abrasion[291] Solubility[481] Granz rays[31] Experimental embryology[413] Experimental hyperthermia[180]	Redox potentials[-78] Pain[381] Bacteriology Nutrition[2-3] Immunity[477] Germicides[313] High altitude[326] Experimental caries Fluoride treatment[202] Caries treatment[7, 177] Gnathodynometer[76] pH[493] Histochemistry[173]	Chemotherapy[472] Topical F[203] Ammonia[251] Vibration[223] Epidemiology Survey[131] Mass treatment[151] Tooth mortality[213] Polymers[88, 100, 406] Experimental surgery[14, 253] Psychiatry[367, 393] Anesthesia (Dec. '46, J.A.D.A.) Casting[216]

Technics, Facilities and Personnel

Research Technics.—The great advances in dental research in the past 50 years have accrued primarily from the application to dental problems of the research methods and technics from other fields of scientific endeavor. A comparison of some of the research activities of the late nineties as seen in *The Dental Cosmos* with those of the forties as seen in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION and the *Journal of Dental Research* is instructive and is shown in the table.

Research Facilities.—In the 1890's, dental research facilities were limited indeed; most of the studies came from the offices of busy practitioners. At the mid-century mark, the comparison is pleasant. The establishment of the National Institute of Dental Research is probably the crowning achievement. Many dental schools have excellently equipped laboratories. More than a few governmental agencies are conducting dental research and, apart from these direct research facilities, important research aids are provided such as the isotope program of the Oak Ridge plant of the Atomic Energy Commission. An active cooperation exists between various industrial research laboratories and dental researchers.

Research Personnel.—In the 1890's, the research was done mostly by men with scientific curiosity but (with few exceptions) lacking in formal research training. Since about 1930, however, there have been increased opportunities for young dentists to receive training in research.

Supported in part by special funds (for example, the Zoller Memorial Clinic at the University of Chicago and the Rockefeller, Carnegie and Eastman fellowships at the University of Rochester), the value of training in research has been acknowledged and today graduate schools across the country have enrolled graduate dentists as candidates for M.S. and Ph.D. degrees. The total number of people trained in these research courses is not large, but the impact on dental education has been one of the important developments of the first half century.—*Harold C. Hodge, Ph.D.*

Aids to Research: Literature

The volume of research in all fields, dentistry included, has enormously increased since 1900. The results of some of this research, relevant to dentistry, appeared then and still does in biological, chemical, or physical journals. Dentistry is deeply indebted to a series of wise editors, culminating in E. C. Kirk, who welcomed research reports to the pages of *Dental Cosmos*. Owing to this policy, editorially reinforced, a sizable segment of the profession had by the beginning of the century acquired an appreciation of the ultimate value of research to the clinician. Since then we have seen the rise of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. Its 40 volumes record the efforts of a strong and alert profession for adequate self-expression, and today it has become the single most important influence upon that profession.

The growth of the specialties has called forth, and has been stimulated by, the respective specialty journals: The *American Journal of Orthodontics;* the *Journal of Oral Surgery; Oral Surgery, Oral Medicine and Oral Pathology;* the *Journal of Periodontology;* the *Journal of Dentistry for Children;* the *Journal of Dental Education,* and the *Bulletin of the American Association of Public Health Dentists.* Most strange is the lack of a journal limiting its scope to prosthetic and restorative dentistry, in spite of the great activity in this field.

The appearance of the *Journal of the Allied Dental Societies,* in the early years of this century, gave a welcome though short-lived outlet for the publication of research.

By far the most sighificant journalistic event for dental research was the creation of the *Journal of Dental Research* by Wm. J. Gies. This act and his generous devotion to the advancement of this journal deserve unstinted praise. Now in its twenty-ninth volume, its importance and influence are recognized throughout the world. To Doctor Gies also goes the credit for establishing the *Journal of the American College of Dentists.*

The *Index to Dental Literature,* developed by Arthur D. Black, has enormously facilitated research, and remains a great tribute and memorial to a great son of a great father.—*Joseph L. T. Appleton, D.D.S., Sc.D.*

Present and Future Problems in Dental Research

It is obviously impossible to predict the course of research in dentistry in the future, just as it is obvious that the directions in which it goes will be determined by the methods available. A number of methods, recently developed, have not yet been used to nearly their full potential promise and their further utilization will undoubtedly yield results more fruitful than any thus far.

In the field of microscopic morphology the electron microscope has already revealed details of the form and arrangement of dental tissues unknown before, and further information will follow the development of refinement of present technics. Morphology is always suggestive of function in living processes and can be expected to be stimulative in other fields.

Effective tools have already been

developed in chemistry and await only the worker's hand. The ability to stop chemical changes during physiological activity, plus the development of new and highly selective dyes, bid fair to reveal the nature of certain fundamental processes which have remained obscure until now. The tagging of molecules by radioactive isotopes constitutes another attack on these same processes.

Of the greatest importance is the increasing number of dentists entering the field of research. Many of these will devote their efforts to studies in basic science, and as these sciences develop new methods it naturally follows that they will be applied to the dental field. It is likely that the barriers between the sciences and between the professions will tend to disappear as the oneness of all science becomes more apparent.—*Allan J. Brodie, D.D.S., Ph.D.*

DIAGNOSIS AND TREATMENT PLANNING

Current Technics

The first intimation that treatment planning was to occupy a very important niche in the advancement of oral health, may be observed early in the history of the first half of the century. As early as 1900 Carl Beck[26] discussed the errors caused by false interpretation of the roentgenogram, and J. N. McDowell[283] the use of the x-ray in the planning of orthodontic cases; shortly thereafter (1901), M. D. Hamisfar[192] discussed the use of biology, microscopy and chemistry in arriving at a scientific diagnosis. Following his article very little was written for the ensuing three years. However from 1904 to 1907 Charles Pike,[338] C. F. W. Bodecker,[68] and G. W. Cochran[132] all entered pleas for greater thoroughness in diagnosis and examination of the teeth. During the same period we find F. L. Satterlee,[378] M. I. Schamberg,[380] and Matthew H. Cryer[123] all advancing the use of x-ray in the realm of diagnosis. Again, for no understandable reason, there seems to be a period (1907-1912) of laxity of enthusiasm on the subject. But in 1912 Robert H. Ivy,[232] writing about the imperfections in the diagnosis and treatment of oral lesions, calls attention for the first time to the fact that treatment planning was a necessity in the diagnosis and treatment of oral lesions. At the same time C. E. Kells[245] and S. Tousey[430] refer to the technics to be used when using x-ray as a diagnostic aid.

From 1912 to 1920 the literature is rather void of articles referring to clinical diagnosis or treatment planning; however, we find a sharp upsurge in the literature on the teaching and use of the x-ray in modern practice, and such authors as H. R. Raper,[351, 352] C. A. Clark,[110] and J. D. McCoy[282] all contributed during that period.

However, as we entered the era following World War I there was exhibited quite a stimulated interest by such writers as G. McConnell,[281] T. B. Hartzell,[201] T. D. Beckwith,[37] M. F. Eusterman,[148] F. F. Molt,[310] W. C. Adams,[2] L. B. Hume,[225] L. M. Ennis,[144] L. B. Higley,[208] L. M. Ennis and H. M. Berry, Jr.,[145] and L. M. S. Miner[309] on the related subjects of pathology and roentgenology leading to a diagnosis. Not until 1935 do we actually find in the literature a definite treatise on the problem of treatment planning by B. N. Pippin,[340] shortly followed (1936) by two excellent books, both having the same title, *Oral Diagnosis and Treatment Planning*, by S. C. Miller[304] and K. H. Thoma.[439] Nineteen hundred and thirty-five seems to mark the turning point in the first half century when all diagnostic aids were, on a national scale, correlated with the course of treatment, and are

now taught in every dental school in these United States.

Writers of this period, however, were not the last to be heard, as many technicians, diagnosticians, teachers and writers, such as J. L. Koehler,[266] L. W. Burket,[95] R. W. Wright,[486] Lester Cahn and H. A. Bartels,[98] J. L. Bernier,[43] D. E. Ziskin and L. W. Burket,[497] and H. B. G. Robinson,[366] have contributed much to the science of treatment planning.

During the first half of the century we have been made to realize that the oral cavity is part of a total person, and that in order to treat intelligently the lesions or diseases associated with it, we must use every diagnostic aid available, correlate our findings and then intelligently plan the treatment so as to restore the oral cavity to a normal healthy organ in the shortest possible time.—*Leroy M. Ennis, D.D.S.*

Significant Advances

Soon after the discovery of roentgen rays, in 1895, attempts were made to utilize them in dentistry, but it was about ten years later before this was made feasible by improvements in the apparatus. Now the equipment has become suitable for the convenient use of dentists, which has marked the greatest advance in diagnosis and has revolutionized dental practice.

The former precept, that the absence of pain or discomfort indicated freedom from dental disease, was contradicted by the evidence of foci of infection which produced no local symptoms. After a period of ruthless removal of pulpless and suspected teeth, the rational procedure of critical examinations for incipient caries and periodontal lesions has established pulp and alveolar conservation as the method of preventing oral sepsis.

Electric vitality tests, microscopic examinations, and transillumination have contributed refinements to clinical diagnosis. Developments in chemistry, electronics, or other sciences may in the future supply diagnostic information far beyond the present facilities.

Treatment planning is essentially the prevention and eradication of disease, with the maintenance and restoration of masticatory function. It is consideration of the need for prophylactic, surgical, or restorative treatment of the entire denture, instead of repair of individual teeth or treatment of incident complications.

The continued teaching of systematic procedure to undergraduates should ultimately make it the prevailing mode of practice. However, there is a marked discrepancy between the textbook or didactic standard and the average plane of service. The mechanics of dentistry are too exacting for the ability of many who attempt to apply them.—*Clarence O. Simpson, M.D., D.D.S.*

Possibilities of the Future

The trend toward specialization in dentistry promises to be the most important single factor in continuing the presently changing concept of oral diagnosis and treatment planning.[5,416] The increasing tendency to emphasize the biologic aspect of oral diagnosis suggests that dentistry envisions a greater responsibility for oral health.[200] The demands by specialty groups, that the basic sciences be emphasized in the clinical branches of dentistry, can be reflected only in the development of well trained dentists for whom well planned, undergraduate, postgraduate and graduate training must be provided. It is obvious that dental schools and other institutions must develop their existing teaching facilities to meet this demand by preparing more intensively, realistically and scientifically for such advanced training.

The biologic connotation in oral diagnosis and its emphasis at the postgraduate and graduate levels will undoubtedly be reflected at the undergraduate level as dental schools develop better facilities

for teaching both the clinical and basic science phases of dentistry.[235] This will not be entirely an automatic transition since many dental schools must acquire a new philosophy in this respect and, unless sufficient inspiration and help is provided by the Council on Dental Education of the American Dental Association and the specialty groups, this may not be forthcoming. This they can provide by advising the dental schools both as to the standards and procedures[276, 334] required and—equally important—as to what the ultimate objectives shall be.

Of major importance is the deficiency in well trained teachers.[230] This deficiency is universally recognized and can be rectified only by a concomitant training program on the part of the dental schools and other institutions to develop the necessary leaders and teachers. Particular emphasis must be placed on the training of those who are to teach clinical subjects, since it is in these subjects that the basic sciences must be applied.[92]

As the dental profession increases its ability to apply scientific knowledge to its problems, so will it advance as a branch of the healing arts.[352] Continued emphasis on fundamental research and continued analysis of the improvement in its teaching program[278] will increase the rate of progress so evident during the past 50 years.—*Joseph L. Bernier, D.D.S., M.S.*

SYSTEMIC RELATIONSHIP OF DENTAL HEALTH AND DISEASE

Changing Concepts Since 1900

At the turn of the twentieth century, maladies of the teeth and their supporting structures generally were regarded as local ailments, and they were dealt with as though they had no relation to general bodily health. The relationship of dental and oral infections to systemic disease had been observed and recorded during the preceding century by Rush,[277] Miller[306] and others; the writings of these men, however, had, in the main, gone unheeded.

During the second decade, writings by Hunter,[227] Rosenow,[273] Billings,[58] Mayo[299] and others emphasized the important role which dental infections and oral sepsis play in the causation of systemic disease. These writings received wide publicity, and almost universal attention was centered on dental infection as a source of focal infection. This occurred at a time when the medical profession was seeking an explanation for many of the chronic diseases it was called on to treat, and extraction of teeth became a panacea for many diseases. To deal with the problem, extensive clinical and laboratory investigations soon were under way, in which the dental profession played an important part. The status of the pulpless tooth as a focus of infection soon became a controversial question,[241] for there were those who contended that all such teeth, regardless of their condition, were a menace to health. Investigations disproved this contention, and it is now generally conceded that sufficient evidence has accumulated to justify the retention of pulpless teeth that have been properly and successfully treated.[64, 181]

Prior to 1900, slight attention had been devoted to the effects of systemic disease on the teeth and oral structures. Erdheim's[147] observations in 1911, of acalcification of dentin in the incisor teeth of rats deprived of their parathyroid glands, stimulated further investigations by Schour[289] and others as to the possible effects of the secretions of the endocrine glands on dental and oral structures. The result was not only a verification of Erdheim's work but also the establishment of relationships which exist between disturbances of the pituitary, thyroid and

adrenal glands and gonads and disturbances of the teeth and their supporting structures.

Nutritional disturbances also came in for their share of attention, largely as a result of the investigations of Mellanby,[302] Howe,[222] McCollum and Simmonds,[280] Toverud[454] and others. Metabolism of calcium played an important role in early studies, and several misconceptions arose; for instance, that deficiency of calcium and disturbances of its metabolism were major causes of dental caries. As time went on, it became obvious that proof of this contention was lacking, and evidence accumulated which showed that, while calcium deficiency and disturbances of calcium metabolism had deleterious effects on the bone which supported the teeth, they did not have any influence on the occurrence of dental caries.[242] That deleterious effects on oral structures result from many nutritional disturbances has been well established by several investigators, including Becks and his associates.[36]

At present, it also is well established that oral infection has a definite effect on general health and that systemic diseases, chiefly infectious diseases, blood dyscrasias, and nutritional, endocrinous and developmental disturbances, have a definite effect on the teeth and oral cavity. It is well recognized that changes in these structures are frequently the first indication of subclinical disease processes elsewhere in the body.[96] Therefore, dentistry is now being called on not only to treat oral diseases but also to aid in the diagnosis of general systemic conditions.—*Edward C. Stafne, D.D.S.*

Present Concept of Focal Infection

The rise and fall of the focal infection theory (as defined by Billings[53]) is an essential feature of the first half of the present century. Already implied in Miller's[306] descriptive title, "The Human Mouth as a Focus of Infection," it became a virile, driving force with the pronouncements of Hunter[227] and Billings.[53] Tonsils and teeth, especially pulpless teeth, were black-listed. Price,[345] Rosenow,[373] and Haden,[188] with many others, toured the country with their propaganda and filled the journals[124] with the oft-repeated story of the recovery of streptococci from primary lesions and the same strains from supposedly secondary infectious conditions. Cotton[117] was treating various forms of mental disease by removing infected and "dead" teeth. His reported cures were no more startling than the thousands reported from other fields. Dentists by the hundreds were eliminating pulpless teeth from the mouths of their patients, and Rosenow[373] was expounding the theory of elective localization which had a very favorable reception in many quarters.

By 1928, the year in which Holman[219] published his critical appraisal, the peak of the rise seems to have been passed. Holman accepted the principle of focal infection in part, but discarded elective localization as not proved. The swiftness of the reaction is somewhat startling and is illustrated by two successive statements of Cecil[103] with reference to arthritis. In 1933 he claimed that "the keystone of the modern treatment of rheumatoid arthritis is the elimination of infected foci"; but by 1938 he is convinced that "in no case was the course of the disease altered or the patient cured when supposed foci were removed." In 1940 a second thorough appraisal appeared, by Reimann and Havens,[357] and their verdict was: "The theory of focal infection in the sense of the term as generally used (and especially with reference to teeth and tonsils) has not been proved." By 1947 the literature on focal infection had dwindled to a mere trickle[349] and that mostly in the foreign journals. The pulpless tooth is now no longer viewed with alarm and has been honored by the foundation of a specialty.

Irons,[230] an early staunch supporter of the theory, as of 1946 affirms a belief in

the benefit that has accrued from the impact of this theory, manifested by better understanding of the mechanism of the spread of the disease. He believes that there is a principle involved that should have recognition in spite of the great excesses that were committed in the name of focal infection. Both appraisals (by Holman and Reimann and by Havens) strongly support what they call a well established concept, to the effect that most infections begin in a primary focus whence they spread to near and remote parts of the body. It is this principle and all its implications that Irons would defend and conserve for clinical use. In this sense there seems to be some ground for a refusal to reject radically the theory in its entirety.—*Edward Hatton, M.D.*

Relationship of Oral Disease to General Infectious Diseases

The oral tissues are frequently involved as a part of a systemic infection such as the oral tubercular lesions in advanced general tubercular infection, the oral mucous patches in syphilis and the oral lesions of generalized moniliasis. In most instances these oral lesions are of minor importance in respect to the general infection. The significance of oral foci of infection as an etiologic or aggravating factor in general infectious diseases has undergone considerable modification in the last few decades.

The discovery of antibiotic agents effective against a wide variety of organisms has lessened materially the general systemic danger of these oral foci. Serious oral lesions may develop from systemic diseases because of the general lowered resistance of the patient which favors secondary infection of the oral tissues. Today these oral lesions can be prevented or minimized by the use of the correct antibiotic. In a similar fashion many systemic diseases which may arise from bacteria in the oral cavity can now be effectively and satisfactorily treated with antibiotics, lessening the systemic danger of oral infection.

The relation of oral infection to systemic disease can be well illustrated by the transient bacteremias following tooth extraction[42] and dental prophylaxes.[272] The site from which the organisms gain entrance into the general circulation and the expected frequency of the transient bacteremias have been repeatedly confirmed by many observers. Tarans[429] has clearly demonstrated the close relationship between the transient bacteremias arising from the oral tissues and the incidence of subacute bacterial endocarditis in individuals with rheumatic heart disease. Prophylactic antibiotic therapy has reduced the incidence both of transient bacteremias and subacute bacterial endocarditis and it is now an established pre-extraction and prescaling routine in patients with rheumatic heart disease.[172]

The more universal realization by the dentist and the physician of the general health benefits of healthy oral tissues should reduce materially the potential systemic danger of oral infection.—*Lester W. Burket, D.D.S., M.D.*

Complexity of the Cancer Problem

At the turn of the century cancer was recognized as a public health problem, but little was actually known about its cause and treatment. It was tenth as a cause of death.[419] However, as the result of the better control of other diseases and the prolonging of the life expectancy of man, the cancer problem increased in importance and magnitude, and cancer rose to second as a cause of death in 1944.[420] This rapid increase in importance as a public health problem stimulated investigation into the cause and treatment of cancer.

Fibiger,[150] in 1908, found a cancer of the stomach, containing a cockroach larva, in one of his laboratory animals. This was the first instance of a laboratory-produced cancer. Yamagiwa,[488, 489]

in 1914, produced cancer of the ears of rabbits by repeated application of gashouse tar, indicating that certain chemical substances might have carcinogenic potentialities. This evidence stimulated investigation, and resulted in the discovery of dibenzanthracene and related substances as carcinogenic agents.[185] Slye and Little's[409] breeding experiments in mice, in which they developed cancer resistant and cancer susceptible strains, suggested an important intrinsic factor. The study of "cancer families," such as the one reported by Warthin, and observation of the inherent characteristics of such neoplasms as retinoblastomas, related genetics to the problem of human cancer and suggested another probable etiological factor.

Rouse, in 1911,[376] reported the transfer of a neoplasm in fowls by an agent inseparable from the tumor cells, and in 1925 Rivers and Pearce[362] indicated that there was a virus associated with transplantable rabbit neoplasms. Shope[402] reported the production of papillomas in rabbits by a virus.

The development of cancer of the hands in x-ray workers indicated that irradiation was an etiological factor in the development of carcinoma. Proof that other forms of irradiation were important was given by the development of osteogenic sarcomas in the individuals who painted luminous dials on watches and clocks.[287]

The control of cancer of the prostate by orchiectomy[224] and by the administration of estrogens[1, 187, 270, 456] related the endocrine factor to neoplasia. Recent advances in the chemistry of tissue enzymes and their effects on cell reproduction and metabolism have indicated that they are very important in the cancer problem and at present occupy a prominent place in cancer research.

The progressive investigation during the past fifty years in the problem of the etiology of cancer has indicated that chemicals,[274] irradiation, viruses, endocrines and tissue metabolism all play a part in carcinogenesis and that the entire problem may be complicated by the hereditary pattern of the individual.

The problem of cancer treatment has received as much attention in the past half century as did its etiology. Surgical technics have been improved, so that more radical surgery permits more complete and extensive treatment of malignant disease. Advances in irradiation, especially deep x-ray and radium therapy, have been directed almost entirely to the treatment of cancer. With the development of atomic energy and radioactive isotopes, a new means of irradiation has developed. Selective irradiation to particular tissues because of the affinity of the tissue for the radioactive substance is the result of this development. The most outstanding example is treatment of cancer of the thyroid by radioactive iodine.[395] The treatment of leukemia by means of radioactive substances[102, 350, 380] offers some possibilities, because for the first time the entire skeletal system can be irradiated.

The treatment of neoplasms, especially leukemia, by chemical therapy has also made rapid progress in the past few years. The use of urethane[188] and nitrogen mustard[339] are outstanding examples of this type of therapy and appear to offer some promise.

As we review the progress made in the treatment of cancer for the past 50 years, it is evident that much has been accomplished in the control and cure of cancer, but like its etiology, the complexity of the problem has been intensified. We have more people cured of cancer today because of the advances in cancer therapy, but it is of little comfort because there is a continually increasing number dying of cancer. In spite of all our experimental and clinical progress, we have accomplished very little in the control of cancer in the past 50 years.

The dentist sees the mouths of patients more often than anyone else and

should be adequately trained in the diagnosis of all oral lesions including those of cancer. Discovery of oral cancer when it is still very well localized is most important and offers great hope for prevention of cancer deaths.[348] The clinical dentist must continue with his careful diagnoses, and the oral pathologist must aid the other scientific workers in the search for the cause of cancer while helping to improve diagnostic procedure.—*Donald A. Kerr, M.S., D.D.S.*

Advances in Nutrition and Endocrines

During the first half of the twentieth century, the twin sciences of nutrition and endocrinology came into their own in both medicine and dentistry.

Perky,[333] in 1901, keynoted the progress that was to come in this half century by stating, "Mankind appreciates today as never before the worth and possibilities of dentistry." Kirk,[253,254] in 1903, and Stauffer,[421] in 1912, further emphasized the close relationship of nutrition and dental health.

Goldberger's classic experiment[173] demonstrating pellagra to be a nutritional deficiency disease, Williams's[478] synthesis of vitamin B_1 and the discovery of Elvehjem and his co-workers[141] that canine blacktongue, (a disease analagous to human pellagra) could be dramatically cured by nicotinic acid, opened up the entire field of vitamin B complex deficiency disease.

Aschoff and Koch,[18] Howe,[223] and Wolbach and Howe[481,482,483] observed the defective formation of collagen by mesenchymal cells during vitamin C deficiency. The important role vitamin C plays in wound healing was further demonstrated by the studies of Lanman and Ingalls,[271] Crandon, Lund and Dill,[119] Hunt,[236] Bartlett, Jones and Ryan,[22] and Wolfer and his co-workers.[494] Wolbach and Howe,[481,482,483] in rats and guinea pigs, and Boyle,[71,72] in humans, described changes occurring in the dental structures in vitamin A deficiency. Erdheim,[146] Becks,[27,33] Eliot[140] and others reported the profound effect of both underdosage and overdosage of vitamin D on the dental and periodontal structures.

Spies,[418] Kirkland[256] and Mann[293,294] emphasized the close relationship of pellagra to Vincent's infection and the hypersensitivity of tissues in thiamine deficiency. Mann also suggested that the tongue be closely examined for evidence of glossitis which may indicate pellagra, anemia, or a riboflavin deficiency.

Albrecht[3] stated that deficiencies of trace minerals in addition to those of calcium, phosphorus, potassium, and other minerals in the human dietary are widespread due to depletion of soils by erosion, wasteful methods of farming, and failure to restore depleted soils. The substitution of carbohydrate, especially of the refined variety, for protein has also produced profound destructive results, not only in increasing the dental caries rate but also in its impact on the metabolism of all body cells. Price[344] and others also demonstrated the destructive effect of the modern refined dietary.

Comroe[115] has stated that most of the advances in endocrinology have been made in the last 50 years. Maggs,[285] in 1901, emphasized the meager knowledge of this important subject at that time. Schour and Massler[388,389] reported the profound effect endocrines have on the formation, calcification, and eruption of teeth and growth of the face. Chayes,[106, 107] Keith and Campion,[247] Hellman,[203] Broadbent,[78] Brodie[82] and others contributed a wealth of knowledge on growth and development of the face and the important role endocrines play in regulating this growth.

Ziskin and his associates[494,495,496,499] described the effect of both underdosage and overdosage of estrogenic and gonadotropic hormones on the gingival and oral mucous membranes, in addition to discussing the present status of pregnancy gingivitis.[498]

Marble, in a comprehensive review[298] of diabetes mellitus, discussed the oral manifestations, diagnosis and treatment of this disease.

The first half of the twentieth century has seen profound scientific advances increasing our knowledge of the metabolism of all body cells as well as those of the dental structures.—*Arvin W. Mann, D.D.S.*

BASIC SCIENCES

Histology and Anatomy

The first decade of this century found the relatively few histologists interested in the dental field largely engaged in the study of tissue structure,[229] as were general histologists. The use of dyes in the nineteenth century had switched attention from the histochemical efforts of Bichat to the relatively simpler and easier field of morphology.[20] However, here and there signs of a change in the dental field were evident. A few outstanding individuals were beginning to attempt a correlation between structure and practical clinical procedures[305,320] and others were endeavoring to relate structure and function.[5,87,451]

The outstanding interests of dental histologists in the second decade were: studies on the calcification of enamel and dentin, typified by the work of Mummery;[314] the structure of enamel in relation to the possibilities of its nutrition, illustrated by the work of Bodecker and Beust;[462] attempts to correlate the metabolism of organic structure of enamel (as demonstrated by Bodecker) with susceptibility to dental caries.[463,467] The question of the innervation of the dentin, still unanswered, received much attention.[315] The problem of enamel nutrition was the most explosive and was capable of generating a heated discussion in any group of dental histologists.

The introduction of procaine stimulated studies of the topographical anatomy of the trigeminal nerve. Other studies on nerve structure and function were the final demonstration of the neuron as the structural unit of the nervous system,[198] the formulation of the modern concept of the reflex arc and reflex action[401] and the development of the doctrine of functional nerve components.

An outstanding addition to our knowledge of the anatomy of the dental area was contributed in 1918 by Noyes and Dewey[321] in their demonstration of the presence of lymphatics in the dental region.

The publications of Gottlieb and later of his students[169,325] in Vienna, as well as those of others from European centers of dental research, began to exert a marked effect on dental histology, especially in connection with oral soft tissues. The later work in this country of Orban, Kronfeld, Becks, Bauer and others of the European schools has done much to add to our knowledge of dental histology.

While the third decade is characterized in general histology as an era of histophysiology, this was not immediately reflected in the dental field. The period 1930-1940 was still predominated by studies of tissue structure. However, different means of approach to these problems were in evidence. The use of soft x-rays[13] and polarized light[100,257] produced evidence of hard tissue structure and variation beyond the range of the conventional microscope.

The use of experimental methods, as opposed to mere observation, in the study of dental tissue development[166] and reaction[152] was slowly increasing.

A potent factor, to be felt later in all aspects of dental research, was the initiation of graduate training for dental teach-

ing and research at the University of Rochester. Early publications of tissue studies from this group were markedly, but not entirely,[82] of a physio-chemical and of a physical aspect as illustrated by studies on the hardness and chemistry of tooth tissues,[122,214,216] x-ray absorption[458,459] and x-ray diffraction studies.[215]

The importance of fascial planes and spaces in relationship to spread of infection was reflected in the studies of Coller and Yglesias[114] and of Kostrubala,[260] along with an ever increasing use of the experimental method.[27,34,75,323,394]

The fifth decade (1940-1950) has been characterized by the application of newer technics in histophysiology,[186,392] histochemistry,[142,474] the greater use of radioactive isotopes[206] and the electron microscope.[75,394]

Studies of the developmental growth of the head have utilized many methods including embryological observations,[12] anthropological measurements on prepared skulls[452] and on living children,[204] experimental approaches[208] and cephalometric roentgenograms.[79]

The problem of the temporomandibular joint[138] has attracted the attention of anatomists to studies of its anatomy and function. Likewise prosthodontists have called on the anatomist for aid.[138,332]

The first half of the twentieth century, after a slow start, has seen a phenomenal growth in the field of dental histology. There is still much virgin territory to be explored and the greater number of better prepared, better subsidized and better organized workers in the field augurs well for the future.—*Paul C. Kitchin, M.S., D.D.S.*

Chemistry

The seeds of chemistry, like those of dentistry and other sciences, found fertile ground in America this past half century. During no other time and in no other place has progress been so rapid. Although many of the new discoveries continue to come from abroad, by far the greatest advances, particularly in biochemistry, came from the laboratories of the American universities and industrial research organizations. Furthermore, biochemistry, the branch most closely allied with dentistry and other health arts and sciences, grew as an entity since 1900. From the lone Department of Biochemistry at Yale in 1900, there rapidly sprang others, at Harvard in 1907, and at every medical and dental school in America. One of the fathers of biochemistry, Gies, did much of his work on purely dental problems, and founded the International Association for Dental Research.

The discovery during the first decade of a safe, efficient and stable local anesthetic has had a profound effect in the elimination of much pain in dentistry. During the ensuing period, many improvements have been made in the alleviation of pain. New local and general anesthetics for almost any type of surgery are available, and the analgesics and hypnotics are plentiful.

At the turn of the century it was clear that "man cannot live on bread alone" and that more than calories and minerals are necessary. After the isolation of the "vital amines" by Funk, in 1907, progress was rapid. It is difficult to separate the impact of these substances on dentistry from that on the other health sciences, but many are very important in the development and maintenance of the oral tissues. About 18 vitamins have been isolated and identified, and many have been synthesized and are products of the laboratory. Although the physiologic responses to a lack of these substances are known, the exact mechanism of their action is to a large extent an enigma. From the data available, they are catalysts or coenzymes concerned with the utilization of food. When the complete story of vitamins is known, it will be an exciting one.

Many endocrine glands were known at the turn of the century, but it was not

until 1902 that Bayliss and Starling recognized that their actions might be due to powerful chemicals. Since then the discoveries concerning the hormones are replete with drama. All of our chemical knowledge of the hormones came in this half century. Thyroxin, epinephrine, insulin, estrogens, androgens, and others have taken their logical places. Here again the dental implications are great and the story is incomplete. Today, the recent discoveries of the hormones of the pituitary gland and adrenal cortex give great hope to the specialists in periodontia, just as the discoveries in carbohydrate metabolism affected the dental caries problem a decade ago.

The discovery of enzymes as chemical entities just before the turn of the century added impetus to the study of living organisms, and in 1897, Buchner fermented glucose without living organisms. Since then, the discoveries in the field of intermediary carbohydrate metabolism have gone far in explaining dental caries.

The chemist has not been idle in respect to new materials for dental practice. Although gold is still with us, other maaterials such as plastics are available for filling. Plastics and hydrocolloids and a host of other materials make toward better and easier dentistry. Just recently a plastic filling material that is polymerized *in situ* has been made available.

When one reviews the chemical advances of the past half century,[10,109,200,318] it is obvious that more progress has been made in this short span than in all previous recorded time.—*L. S. Fosdick, Ph.D.*

Bacteriology

At the end of the golden age of bacteriology, during which bacteria had been shown to cause most of the principal death dealing diseases, Goadby[167] stated that bacteriology had developed "so that at present some 1500 types of organisms have been described and a large portion of them are to be met with occasionally in the mouth." The ecology of the oral cavity has offered a challenge to bacteriologists during the past half century. The incidence and distribution of the oral biota is not a simple problem and has not yet been studied in a complete manner. The flora appears to change from time to time, strikingly so with eruption and loss of teeth.[14] There are a number of factors which influence these changes, including the clearing mechanism[15] and the antibacterial factors of saliva.[111,210] Studies of the basic oral flora have placed us closer to an understanding of the mechanism of infectious oral disease and the realization that, by killing extraneous organisms, the saliva not only stabilizes the bacterial population of the mouth but also helps to prevent infection by pathogenic organisms.[50,126] Some types of oral bacteria such as fusiform bacilli,[213] leptotrichia[49] and actinomycetes[51] have been cultured and classified, but as yet there is no reason to believe a final classification has been reached.

At the beginning of the century we knew that fusiform organisms and oral spirochetes occurred in association with a particular type of necrotizing gingivitis. These organisms have been studied by a number of individuals including Rosebury,[270] Tunnicliff,[455] Hine and Berry,[213] Smith[411] and Hampp.[193] Hampp[194,195] has utilized many methods and his cultivation of oral treponemes has been an important contribution to general bacteriology. The ability of these organisms to produce disease has been studied experimentally.[370]

The bacteria involved in dental caries have been investigated without any single organisms having been indicted. Kliger,[259] Goadby,[93], Bunting, Jay and their co-workers,[93,235] Rodriguez,[368] Harrison,[199] Rosebury[309] and others have contributed to our knowledge in this area. Tests for caries activity based on bacteriology[38,189,412] have received wide acceptance. The ecology of the bacterial plaque

deserves much more attention if the early phases of caries activity are to be carried to greater definition than that so well outlined by Miller.[307]

Probably the most important advance in thought has resulted from the demonstration that both bacterial morphology and function undergo wide variations. This knowledge together with the realization of the variability of tissue resistance helps us to understand what happens when oral bacteria are transplanted into other tissue sites as in the establishment of bite wound infections[21] or actinomycosis.[371] Of more importance is that it helps us to evaluate the significance of the passage of bacteria into the blood stream which has been shown[322] to result from tooth extraction. The finding[274] that such postextraction bacteremias might give rise to acute attacks of endocarditis has led to the discovery that the streptococci associated with endocarditis are serologically identical with those occurring in the mouth.[399] The growing appreciation of the importance of the antibiotic or other defensive potentialities of the normal bacterial population of the body is likely to give rise to renewed interest in the bacteriology of the mouth. There is no question that this field will continue to be the center of much high grade bacteriological research.—*Basil G. Bibby, D.M.D., Ph.D.*

Oral Pathology

At the turn of the century the pathology of the mouth was principally dental pathology. Dental pathology was taught not as a separate subject but in conjunction with some other subject such as operative dentistry or dental surgery.

The dental literature dealing with pathology of the mouth was devoted almost entirely to dental pathology. For the sake of the record, however, it is interesting to note that the famous three volume work, *American System of Dentistry*,[278] edited by Litch, which was published in 1886, contains a section on dental pathology and a section on oral pathology. The latter embraces tumors of the jaws and soft tissue disease of the mouth and throat. This is of more than passing interest, for it shows that the leaders of the time considered the pathology of the mouth and even the throat the province of dentistry. Little heed was paid to this thought, for in the first decade of the century the pathology of jaw tumors was scarcely touched upon either in dental teaching or dental literature. It was not until 1912 when Scudder's classic, *Tumors of the Jaws*,[395] came out, that any impetus was given to this subject. Soft tissue lesions, aside from syphilis and some forms of stomatitis, were almost completely ignored in dental literature.

In 1925 there appeared *The Pathology of the Mouth*,[311] by Moorehead and Dewey, and this was actually the first book published in the United States that one could call an "oral pathology." This book was a milestone in the history of oral pathology and has never received the recognition that it should have been accorded.

The first textbook with the title of *Oral Pathology*[91] was that written by Russell W. Bunting which came out in 1929.

Books solely devoted to dental pathology or combined with general pathology or some therapeutic procedures continued to appear. The outstanding dental pathology was Kronfeld's, *Histopathology of the Teeth and Surrounding Structures*.[267]

In 1934 Thoma's *Clinical Pathology of the Jaws*[434] appeared and in 1941 the same author brought out the monumental *Oral Pathology*[440,441] which covered both the clinical and microscopical aspects of practically every oral lesion and deformity. The *Pathology of the Oral Cavity*,[97] by Cahn, was published in 1941 and in 1943 the *Differential Diagnosis of Oral Lesions*[40] by Bernier appeared.

We cannot cover the history of the development of oral pathology without brief mention of three noteworthy events that materially aided in the evolution of this subject. These are, the establishment of the Registry of Dental and Oral Pathology in 1933, under whose auspices three editions of the *Atlas of Dental and Oral Pathology* appeared; the formation of the American Academy of Oral Pathology in 1946; and the creation of the American Board of Oral Pathology in 1949. The approval of this board (1950) by the American Dental Association establishes oral pathology as a recognized specialty of dentistry.—*Lester R. Cahn, D.D.S.*

Dental Materials

The history of operative and prosthetic dentistry during the last five decades is largely a story of the development of new materials, instruments, and technics combined with improvement or abandonment of the old. Thus dentistry, as well as other technological professions, parallels the achievements in pure and applied science. This parallelism does not always run concurrently. When a new technic or instrument is produced, considerable delay frequently occurs before its use in dentistry. A decided reduction in this delay has resulted from research on the physical and chemical properties of dental materials and the development of specifications by the National Bureau of Standards and the American Dental Association, which placed the use of these materials on a sound scientific basis.[418, 430]

Operative Dentistry.—The inlay casting process was the greatest single advancement in operative dentistry during 1900-1950.

Amalgam is still the most important therapeutic material used in restorative dentistry. By far the two most important developments are: (1) the knowledge that excessive corrosion and expansion, with their frequent accompaniment of postoperative pain, is caused by contaminating zinc-containing amalgam with moisture;[287] and (2) the influence of technic upon the physical properties. These laboratory investigations explained a whole host of clinical observations on the behavior of amalgam, and present a good example of how the research laboratory was able to discover that which thousands of dentists observing millions of amalgam restorations for decades were unable to do.

It is believed that the existing comparatively inactive state of research on the development of a new plastic alloy or a modification of the old amalgam is about to change; the elimination of zinc, the substitution of other elements such as indium or gallium for some of those now present, and new applications of metallurgical science are perhaps in the offing.

Zinc phosphate cement, the best luting material that the dentist now has, is extremely unsatisfactory as it disintegrates rapidly in the mouth and is not adhesive. It is essentially the same as it was about 1900.[335] Surely one of the most important advances to come in operative dentistry would be the development of an insoluble adhesive resinous cement that would not irritate the pulp. The development of such materials will follow the increasing tempo of the advancement of science in general. Already there are evidences that preventive measures[48] other than use of dental materials will alter the course of operative and prosthetic dentistry during the next 50 years.

Prosthetic Dentistry.—The dream of a natural-appearing denture base came true about 1937 when methyl methacrylate resin began to supplant hard rubber.

The development of investments, gold based and chromium based alloys, hydrocolloidal duplicating and impression materials, together with more precise and time-consuming technics and the advent

of the commercial dental laboratory, changed the practice of prosthetic dentistry. The cast partial denture is probably the one single item most responsible for this change because its fabrication was so time consuming. Consequently where the dentist formerly selected prosthetic dental materials, the laboratory technician does now to a great extent. Unless the dentist starts to select the materials he desires by prescription to the laboratories, he will not maintain the control over dental service that he should have.[487]—*George C. Paffenbarger, D.D.S.*

General

There are numerous references in the literature of the nineteenth century that call attention to the relationship of disease of the teeth to systemic disease. This was forcibly drawn to the attention of the profession by Hunter,[227] in 1910.

During the early part of this century, dental training was in a large measure conducted by proprietary schools, and even as late as 1921, 21 of the 50 existing dental schools were privately owned.[134] Because of the nature of some of these institutions and because of emphasis in mechanical training,

> . . . in most dental schools, instruction of dental students in medical sciences has been unwisely directed, indifferently given, and poorly assimilated, and the practice of dentistry has failed from the lack of knowledge, ability and vision, to measure up to its opportunities in health service.[135]

The change in thought of professional responsibility and opportunity, coming concurrently with the assumption of dental education by universities and the resultant improvement in educational standards, has placed increasing emphasis upon the scientifically trained dentist with a more fully rounded basic knowledge.

In the more recent years, marked progress has been made in quality of basic teaching with definite improvements in the correlation of fundamental training with clinical practice. This is due in part to the constantly increasing number of men with dental degrees who also have special training in one or more basic sciences. A twofold value has resulted.

First, these men have adopted teaching as a life work and have incorporated methods by which the training in the sciences has become a real and vital part of dental practice.

Second, the special training of the teachers of basic sciences has produced a corps of men grounded in science and engaged in dental research. The dental research today is extensive in all fields of dental disease and the quality of that research is vastly improved. If progress in the dental health of the nation is to be made through the prevention of disease, it is certain that the basic sciences will contribute their share to that goal.—*Thomas Hill, D.D.S.*

PREVENTIVE DENTISTRY

Present Status of Preventive Dentistry

Since the beginning of the twentieth century there has been a rapid sequence of discoveries in physiology and pathology. New concepts of the action of hormones, vitamins, new pathogenic micro-organisms, the manifestation of allergic reactions, and others have enhanced the narrow concept of Virchow's (1855) cellular pathology. These advances, along with the tremendous development of biochemistry and chemotherapy from Ehrlich's 606 to the antibiotics of Waksman, have brought about a comprehensive precept of correlated pathology. The

application of principles of human biology and the basic sciences in the management and prevention of pathologic manifestations of the oral region is the goal of dental medicine, a comparatively new discipline in the science of dentistry.[28, 66, 116, 440, 441] The elimination of focal infection may be mentioned as one of the most beneficial results of this medicodental alliance. Severe oral symptoms due to nutritional deficiencies such as the avitaminoses in scurvy, rickets and pellagra have almost disappeared in our population. Caution has to be observed, however, in the discriminatory administration of vitamins, since in some instances (fat-soluble vitamins) the overdosage may be dangerous.[27, 31] More emphasis, therefore, is to be placed on the differentiation of the specific effect of vitamins and the interrelation of their biochemical actions as components of the enzymatic and hormonal systems. Recent research shows a definite effect of various vitamin B complex fraction deficiencies with particular reference to nicotinic and pantothenic acid on periodontal structures.[34, 317, 464] Experimental production of congenital defects (cleft palates) by means of riboflavin deficient diets[470] or the injection of trypan blue[464] opens new possibilities for the understanding and prevention of congenital malformations. Citrin (vitamin P) has proved to have a beneficial effect on capillary permeability and perhaps on some periodontal disturbances,[96] whereas vitamin K has been proposed as an enzyme inhibitor, a prophylactic agent against caries.[137]

Control and prevention of dental caries still remain the foremost problem in dentistry. Its scope has been considerably augmented since Black's postulate of "extension for prevention." Innumerable studies reported during the last few years testify to a continuous and ardent effort to elucidate the etiology.[4] Two schools of thought may be distinguished. On one side an overwhelming majority believe that there is sufficient evidence that caries is initiated by acids formed under bacterial plaques by the degradation of carbohydrates, accompanied or followed by a bacterial disintegration of the organic substance.[137] On the other hand, there is a smaller group who are of the opinion that the proteolytic bacterial attack produces the initial stage of the carious process.[66, 188, 168] The latter concept still requires the reconciliation of Miller's contention in 1902 that there is an apparent connection between caries incidence and the amount of concentrated carbohydrates in the food intake.[308] Control measures of caries have been directed either toward the indirect or predisposing factors such as the tooth structure itself, saliva and diet, or toward the direct or exciting factors including the excessive refined carbohydrates and acidogenic bacteria. After complete formation of the teeth, proper vitamin and mineral intake offers no substantial protection in caries prevention,[364] whereas topical application of 2 per cent sodium fluoride may reduce caries activity in population groups to the extent of[127] 40 per cent. Other proposed control agents such as various enzyme inhibitors and antibiotics are found to be able to lower the lactobacillus index, but no evaluation of their effectiveness will be possible without extensive clinical examination. Clinical statistics, conducted over ten years, showed that the restriction of the caries producing substrate in refined carbohydrates reduced caries incidence in 90 per cent of several thousand individuals studied.[29, 33] Restriction of carbohydrate intake combined with an adequate oral hygiene constitutes at present the most effective individual measure to prevent tooth decay.[150, 238]

Periodontal disorders also constitute pathologic entities which are of paramount interest and concern to dentistry. Their prevention, because of the multifarious etiology, may be divided into (1) the control of the local irritants and functional disturbances,[324] and (2) the elimination of systemic factors.[30] Among the

latter nutritional deficiencies, neurovascular and blood dyscrasias as well as endocrine disorders are frequently responsible for periodontal pathosis.[286, 354] Early recognition and therapy of systemic dysfunctions are a prerequisite of controlling these conditions.[290] Extensive studies during recent years have directed attention toward the effects of various hormones, in particular thyroid and growth hormone, upon the epithelial attachment and the maintenance of the supporting tissues.[25, 82]

Prophylactic orthodontic treatment at present is concerned with the control of environmental factors influencing the development of dentition.[417] Thorough understanding of lamellar bone growth and development of the dentition is the starting point for a more comprehensive prevention of malocclusion.[24, 80, 82]

Progress in the development of preventive methods will be the index of the advancement and achievement in dentistry. Dental research, with its altruistic devotion to unveil new knowledge, will continue to serve this noble intention. To use a statement of Milton Rosenau:[372]

> Preventive medicine dreams of a time when there shall be no unnecessary suffering and no premature deaths; when the welfare of the people shall be our highest concern, when humanity and mercy shall replace greed and selfishness. Preventive medicine dreams of these things, not with the hope that we, individually, may participate in them, but with the joy that we may aid in their coming to those who shall live after us. When young men have vision the dreams of old men come true.

These words of wisdom certainly can be applied also to dentistry of the next half of this century.—*Louis J. Baume, Dr. Med. Dent., and H. Becks, Dr. Med. Dent., D.D.S.*

New Technics and Mechanisms in Preventive Dentistry

During the past 50 years the marked increase in the number of dental technics and mechanisms which are designed to prevent, rather than cure, dental ailments, lends emphasis to the change in attitude of the dental profession from one of mere "restorative-mindedness" to that of a consuming interest in the prevention of oral defects and disease.

One of the first great preventive technics to be introduced was the adaptation to dentistry of William Konrad Roentgen's discovery of x-rays. Within fourteen days of the announcement of this discovery in 1895, Walkoff had taken the first dental x-ray, and to him and such early dental radiologists as Van Woert, Kells, Raper, Simpson, Ivy, and Cieszynski the profession and the world owe an eternal debt.[143]

The development of pedodontics during the past 50 years into an important, well organized specialty of dentistry which is taught in every dental school, is evidence in itself of the growth of emphasis on prevention.

The integration of the basic sciences into the dental curriculum in the early part of this century has been a springboard from which many of our more important preventive technics and mechanisms have been launched. Of particular importance was Miller's[307] application to dentistry of the then infant science of bacteriology, and his elaboration on the chemoparasitic theory of dental caries previously suggested by Leber and Rottenstein.[275] These early developments led directly to the method of caries control by low carbohydrate diet developed by Bunting and his co-workers,[84] and Hadley[189] and Jay's[236, 237] lactobacillus count as a measure of caries activity.

The work of Dean and his co-workers[127, 130, 131] in establishing the relationship between natural fluorine in the water supplies and the low incidence of dental caries has led to two important mechanisms of caries control. Knutson and Armstrong[262, 264, 265] and other workers[45, 460] have established that topically applying a 2 per cent solution of sodium

fluoride to the enamel of the teeth renders them less susceptible to the action of acids, and that a 30 to 40 per cent reduction in caries can be attained in this way. Large scale experiments now under way seek to demonstrate that the addition of one part per million of fluoride to public water supplies will reduce the incidence of dental caries. However, final evaluation of this method of caries control cannot be made until the conclusion of present studies.

Kesel and his co-workers[249] have demonstrated *in vitro* that the ammonium ion is inhibitory to certain of the organisms associated with dental caries and clinical application of these findings has been attempted by the addition of dibasic ammonium phosphate and urea to dentifrices. Hill[211] has demonstrated the effectiveness of penicillin in reducing lactobacillus counts and Zander[500] reports that brushing the teeth daily with a penicillin tooth powder appreciably reduces the incidence of dental caries. Preliminary evidence that chlorophyll derivatives may have some value in control of caries has been presented.

No discussion of preventive technics in dentistry should be closed without reference to preventive measures now widely used in periodontics as a result of which the elderly patient need no longer expect to become a dental cripple because of disease of the supporting structures.

While it is true that some of these preventive measures must await definite proof of effectiveness in future years, others are in daily use and have contributed to the dental health of millions of human beings. Furthermore, there is every reason to believe that some of the preventive measures still considered experimental will soon be confirmed as effective, and that the second half of the twentieth century will see an ever increasing number of preventive technics and mechanisms introduced into the practice of dentistry. — *F. Darryl Ostrander, D.D.S., M.S.*

The Role of Prevention in Pedodontics, Orthodontics, Operative Dentistry and Periodontics

The prevention of dental and oral disease should begin during pregnancy, to assure the fetus's receiving the substances necessary for the development of a strong, normal body. The general health of the child is directly related to the health of his oral tissues. Disturbances of certain endocrine glands (thyroid, parathyroid, pituitary), affect the growth and development of the jaws and teeth, while disease of the pancreas (diabetes mellitus) may result in disturbance of the supporting dental tissues.[389] Deficiencies of certain vitamins are evidenced in the oral cavity as abnormalities of the teeth or their periodontal tissues.[391] Early recognition and treatment of such general health problems often forestall later serious complications.

Based on original observations, early in this century,[284] that fluorine in drinking water caused enamel fluorosis (mottled enamel), with which was associated a reduced dental caries incidence, more recent workers[19, 129, 263] have studied the teeth of children in areas of fluoride-containing waters. Several studies are now in progress to determine the caries-prevention potential of artificially fluoridated city water supplies. Numerous studies have been reported[47, 48, 262] which indicate that, properly applied to the surfaces of children's teeth, sodium fluoride may result in an average reduction in dental caries incidence as high as 40 per cent. Large scale programs of topical fluoride applications are now in operation in the United States.

Investigations have shown that certain substances inhibit the growth and reproduction of oral bacteria which are associated with dental caries. Among these substances the ammonium ion is apparently[183] one of the most effective inhibitors of the oral lactobacilli. Dentifrices and mouthwashes containing appreciable

amounts of ammonia and carbamide have been recommended[208, 280] and are readily available today. Proof of the effectiveness of such dentifrices in caries prevention is not yet available.[261]

Recently a method has been described[178] for impregnating the organic material of enamel with zinc chloride, potassium ferrocyanide and silver nitrate, with a resultant decrease in caries incidence. Proof of the effectiveness of this procedure is still wanting.[261]

Earlier efforts toward caries prevention included the application of silver nitrate to pits and fissures and to the contact areas of teeth.[346] Another procedure, prophylactic odontotomy, calls for the excavation and filling of pits and fissures in children's teeth before they become carious. This preventive operation was championed[228] strongly during the third decade of this century and still has its advocates today.[244]

In the field of pedodontics, the retention of healthy primary teeth until their normal shedding period is greatly to be desired. Where the primary second molars are prematurely lost, it is important that space maintainers be constructed[74] to prevent mesial drifting of the first permanent molar, with the resultant impaction of the permanent second bicuspid. The malocclusion which results often leads to serious periodontal problems in the early adult period.[445]

The early recognition and treatment of developing systemic abnormalities are important in the prevention of serious dental problems.

Preventive orthodontics is receiving more attention[74, 81, 209, 280] than previously.

The development of cephalometry has been of great value in clinical orthodontic research.[78, 82]

In operative dentistry, the excellent principles which were so well defined early in the present century[58] still serve as the basis for our work in this field. Proper contours, contacts and marginal adaptation serve to prevent the development of periodontal disease.[449] Proper endodontic treatment, utilizing the newer antibiotics,[152] often makes it possible to prevent the loss of strategic teeth which would otherwise be sacrificed.

Many factors, systemic and local, in the production of periodontal disease appear during childhood or in the early adult period.[423] If recognized in their incipiency, treatment will often prevent serious periodontal disease.

It might be emphasized here that the early recognition of malignant lesions of the oral cavity is a life-saving preventive measure.

We can confidently look for greater advances to be made in many phases of preventive dentistry during the next half century than in that just past.—*B. O. A. Thomas, D.D.S., Ph.D.*

ADVANCES IN ORAL SURGERY

The oral cavity was a no-man's land in the beginning of the twentieth century. Dentists, by education and demand, concerned themselves largely with the mechanical problems dealing with the teeth. Physicians looked only at the tongue. This in spite of the first American text on oral surgery written by Garretson[161] in 1869.

Exodontia was developed as a dental specialty and was given great impetus when George Winter published his text on the classification and removal of the third molar.[480] His spirit and influence contributed greatly to the expansion of dental surgery.[375] The discovery of procaine in the first decade and the development of conduction anesthesia made it possible for the dental surgeon to perform many surgical operations in the

office[149,153] since at that time, very few dentists had access to hospitals.

The concept that oral sepsis contributed to poor general health, as revealed by Hunter (1911),[227] aroused the interest of the medical profession, was a challenge to the dental profession, and had much popular public appeal.[165,179,188,202,343] The new interest in dental disease was timely, and was abetted by the use of the roentgen ray to demonstrate hidden oral disease.[54,405,442] These were the essential props for the stage setting.

The numerous shattered jaws and facial injuries of World War I made a significant demand on the skill of the comparatively few men trained in major oral surgery.[246,432] In the postwar period, the demand for traumatic surgery of the jaws continued because of the increasing frequency of civilian accidents caused by the popularization of the automobile and the speeding up of industrial machines.[233,245,424] The demand for oral surgery multiplied and hospitals required the services of oral surgeons on their staffs.

Another great influence on the development of oral surgery was the lengthening of the dental curriculum and inclusion in it of the basic sciences as well as research in oral pathology.[365] In the words of Osler, "a man's practice is as his knowledge of pathology." A new concept was disseminated and oral surgery, though developed strictly as a dental specialty, helped to integrate medicine and dentistry.

During World War II, the great discovery of the antibiotics[217,234,263,279,410] made oral operations, which so often had to be performed in a field where complete asepsis was difficult to maintain, much safer, and contributed to the development of technical procedures which formerly were apt to be accompanied by serious infection.[443]

Army field dental service. Left: Dental operating room in France, 1918. Right: Dental treatment with chest 60, World War II

Among the advances recently made may be mentioned the administration of inhalation anesthetics through an intratracheal catheter, and the use of intravenous anesthesia combined with gas and oxygen.[16,99,155] In the field of dental surgery, the extraction of teeth is now frequently combined with alveoplasty to correct deformities for denture construction.[339] Odontotomy has been widely ac-

cepted as a procedure to facilitate odontectomy.[90, 331, 444] Dental infections and their serious sequelae, cellulitis, facial abscesses and osteomyelitis may be prevented by the prophylactic use of penicillin and are more easily cured by antibiotic treatment combined with good surgery applied promptly.[350, 438] The use of skeletal fixation was developed[465] and internal wiring fixation revived for badly displaced fractures that are not easily controlled by intermaxillary fixation. With antibiotic therapy, these have become a safe and satisfactory procedure.[174, 296] New methods have been devised to relieve diseases of the mandibular joint and their complications such as Costen's syndrome.[296] Cysts and tumors of the oral tissues and jaws have been thoroughly studied and classified[363, 437, 445] in order to aid in the selection of the best methods for complete surgical removal. Technics have been developed to obliterate with Gelfoam the resulting cavitations in the jaws to shorten the period of reconvalescence.[433] Startling results have been obtained by means of ostectomies for the correction of prognathism and underdevelopment of the mandible.[136, 281, 466] By means of other plastic procedures, various malformations, congenital or acquired, may be remedied.[39, 281, 435, 436]

Dental service in the Navy aboard a modern fighting ship

By the extension of postgraduate and internship training, dentists are now being formally trained in oral surgery, and those qualified may be certified by the recently formed American Board of Oral Surgery.[6, 7] Diplomates of the American Board of Oral Surgery, therefore, should

Interior and exterior of Navy mobile dental unit

be recognized by teaching institutions, hospitals, and government services, and supported by their dental confreres. If the dental profession stands firmly behind them, a glorious future can be predicted for this dental specialty in the second half of the twentieth century.—*Kurt H. Thoma, D.M.D.*

RESTORATIVE DENTISTRY

Developments in Operative Dentistry

The term "operative dentistry" was all-inclusive at the beginning of the twentieth century. Textbooks with this title contained chapters devoted to the anatomy, histology, examination, discoloration, separation, extraction, replantation, denudation, erosion and cavity preparation of the teeth of children and adults. John Sayre Marshall, M.D., Dental Surgeon, United States Army,[297] wrote brilliantly on anesthetics, local and general, hematogenic calcic pericementitis, cataphoresis, dental caries, bacteriology of the mouth, treatment of carious teeth by obturation as well as other subjects. His text was published in 1901. C. N. Johnson[241] edited a similar volume written by seventeen eminent contributors, all dentists save one, eight with degrees in addition to their dental degree, seven with M.D.'s, two with master's degrees, one with a degree in pharmacy and all with exceptional general as well as dental knowledge. They were typical of the leaders in the field of operative dentistry in 1900.

G. V. Black was one of the first to recognize that the term, "operative dentistry," required some degree of limitation in view of the increase in volume of dental knowledge. His textbook on *Operative Dentistry*,[58] published in 1908, was divided into two parts. One volume was called *Pathology of the Hard Tissues of the Teeth*, the other, *Technical Procedures in Filling Teeth*.

As so many of the early leaders in the field were learned in the basic medical sciences of their day, it is not surprising that the fundamental factors governing surgical procedures were well developed at that time. Black's system of cavity preparation is a good example of a surgical technic derived from study of the related basic sciences.[57] He was so far advanced for his day and his clinical applications of basic principles were so thorough that most of the first half of the century passed before further significant contributions were made in this area. Additional information concerning tooth physiology and pathology has been developed by such research workers as Jeserich,[237] Gurley,[184] Bodecker,[65] Zander,[491, 492] Manley,[288, 289, 290] Thomas[446, 447] and Shroff.[403]

Taggart's[427] presentation of the casting process in 1907 led to replacement of welded gold foil by inlays in general practice. Black's scientific studies on amalgam alloys stimulated the growth of a new specialty, dental materials.

Bronner[83, 84, 85, 86] applied and enlarged the principles advocated by Black when he devised a preparation for amalgam based upon studies of the natural history of the carious process, thickness of dentin and enamel, tooth form, and engineering principles concerned with retention of restorations. Gillett and Irving[171] advocated surgical procedures for the cast gold inlay that were based upon a desire to protect the pulp, conserve tooth substance and gain maximal extension for prevention. The result was called the "slice preparation." A modification of Black's amalgam box type preparation for inlays was proposed by Ward[469] and is now in common use.

Similar considerations, conservative surgical procedure with less trauma and

pain, have led to R. B. Black's[59] invention of a new method for cutting hard tooth tissues. It employs abrasive driven at high speeds by compressed gas as the cutting agent. This new surgical aid is relatively painless and very rapid. The apparatus is still in the developmental stage.

The new *American Textbook of Operative Dentistry,* edited by Arthur B. Gabel,[159] gives little space to the specialties other than dentistry for children. The new Black, edited by Robert E. Blackwell,[61] is divided into four volumes. Zabotinsky's text,[490] *Technic of Conservative Dentistry,* devoted solely to surgical technics for the hard tissues, reveals the pattern and scope of operative dentistry in the near future.—*Sumter S. Arnim, D.D.S., Ph.D.*

Progress in Operative Dentistry

One by one operative dentistry has lost many of its allies during the past fifty years.[60, 77, 89, 347, 455] Today it includes mainly the restoration of individual teeth.

Recently some materials of a nonmetallic nature[191, 196] have been introduced and used as a supplement or substitute for the alloy restorations. This would imply that for 50 years we have been using basically the same materials for the restoration of lost tooth substance. However, in the past two decades restorative materials of gold and silver alloy especially have been altered considerably in composition to compensate for their behavior in actual use. This comparatively recent advancement, and the realization that the physical properties of these materials must be kept constantly in mind, have been a keynote of progress.[55, 383, 400, 414, 425, 431, 468]

A study and more recent knowledge of compensation for casting shrinkage, and the work with investments, hygroscopic and regular, have been a tremendous step forward.[118, 218, 252, 336, 384, 457] Advancement in amalgam manipulation has been particularly evident in the last ten years, after a wave of unpopularity in the mid-half century.

Silicate cement[125, 329, 383] appears to have carried about the same qualities, with some improvement, from its advent to the present day, and much depends on the method of handling for lasting results. Zinc phosphate cements are under constant surveillance in the testing laboratory concerning their specifications and ultimate improved qualities. Root canal therapy has fluctuated greatly in popularity and practice. We find it fading through the last decade or two and recently revived to take its former place and position. The art of dental ceramics has progressed from a basis of centuries of experience in the ceramic industry.[184]

Today, we acknowledge the advances in instrumentation for the handling of the restorative materials.[237] The amalgamator, proportioner and mechanical condenser or vibrator for alloys of silver have provided uniformity before impossible. The pneumatic condenser and improved instruments have been a factor in reviving the use of gold foil; and the rubber-dam probably never will be superseded as an aid in restorative work.

Currently we have for use the recently developed diamond stones and carbide burs, but a further advancement is the even more recent air-abrasive technic.[59]

The several impression materials, regardless of recent trends back to direct inlay restorations, are to be considered.[121, 406] The hydrocolloid and alginate materials are receiving limited use and now are being studied regarding their limitations. The direct resinous filling materials and other acrylic restorative materials are in practically the same category today and many practitioners are waiting for sound information as to their lasting qualities.

The introduction of the plan of complete mouth treatment and restoration, rather than individual tooth repair, based on biologic consideration, with roentgenographic and laboratory aided diagnosis

and case planning, probably has been the greatest step forward in the past 25 years.

At present we are challenged to give constant attention to advancement and knowledge of methods that can be specifically applied in practice to improve the quality of operative dentistry in today's patient. There is need for improvement and this challenge can be issued to all who are interested in seeing operative dentistry achieve a higher level of quality in the 50 years to come.—*Donald A. Keys, D.D.S.*

Crowns and Fixed Partial Dentures

The end of the nineteenth century was a period when pulps were generally removed and crowns and bridges were retained by dowels placed in the root canal. Where the pulps were not removed the Morrison gold shell crown usually was used. Also fixed bridges, with porcelain facings and a gold or platinum framework, gradually were becoming more extensive until fixed bridges restoring 14 teeth were not uncommon.

A growing interest and development was also taking place in the field of dental ceramics. By 1887, C. H. Land had reported porcelain inlays used in a platinum matrix. Later Land presented his porcelain veneer crown fused to platinum plate adapted to a prepared tooth; this was about 1889-1902.

John Carmichael, in 1906, gave the profession the Carmichael crown, which was the forerunner of the present three-quarter veneer crown.

When, in 1907, William H. Taggart gave the profession his casting technic, he made possible most of the progress that has taken place in restorative dentistry during the first half of this century. Dentists everywhere were stimulated to further research. Abroad H. W. C. Bodecker, in 1911,[70] published *The Metallic Inlay, A Milestone in the Field of Casting.* Here at home the investigations of C. S. Van Horn, W. A. Price, and Marcus Ward advanced the casting process until climaxed by research paper no. 32, issued by the U. S. Bureau of Standards in 1928, which reported the results of its investigations on the physical properties of dental materials and dental castings. Later investigations of F. Meyer, C. Scheu, and G. Hollenback gave us our present day precision casting technics.

Following the introduction of the Carmichael crown and the casting method, Edward Pinker, in 1910, refined the three-quarter preparation so that less tooth substance was removed, and redesigned it so that it was stronger mechanically and safer biologically. Less bulky castings were also possible because, in place of soft gold, new gold alloys were developed possessing high physical properties. Thus, in the period 1910-1918, the emphasis for crown and bridge retention was shifting from the dowel in a treated root to the crown portion of a vital tooth. Also bridge retainers, crown and pontics were so designed as to avoid any pathologic sequelae.

In 1916 Adolph E. Schneider[266] presented a scientific basis for the present day porcelain veneer crown, thus ushering in a new era of interest in porcelain. From 1915 to 1925 there appeared texts by outstanding dentists: James H. Prothero, 1915; Herman E. S. Chayes,[105] 1918; William A. Capon,[101] 1920; J. F. Hovestad,[221] 1924; and A. L. LeGro,[272] 1925.

The second quarter of the twentieth century has witnessed further developments: biological investigations of the last 25 years have given newer concepts of the relationships of the tooth to its investing tissues and the reactions of these tissues to changed environment inducing clinicians to consider these factors in the design and construction of restorations.

There have been better understanding and application of the physical and mechanical principles of engineering to the preparation of teeth and bridge design.

The specifications for dental materials formulated by the U. S. Bureau of Standards[118, 279] are a significant achievement of this period.

Two types of new materials were developed and accepted by dentistry during this recent period: the synthetic resins, particularly the methyl-methacrylate group, and the hydrocolloid impression materials. Their use may still be regarded as experimental.

It is hoped that at the end of this century dentistry will have advanced so far in its understanding of those factors which cause the destruction and loss of teeth that the repair or replacement of teeth will be resorted to only when the conditions are the results of accidents or congenital aberrations.—*Stanley D. Tylman, D.D.S., M.S.*

Removable Partial Denture Prosthesis

During the past 50 years the use of removable partial dentures for the replacement of some of the natural teeth has increased considerably. Early in the century, partial dentures were employed only in those cases where no abutment teeth, which could be used for fixed bridge support, were available.

During the early period, partial dentures were made largely by the use of swaged plates and plier contoured clasps which were assembled by soldering.

In this period many ingenious devices for the retention of partial dentures made their appearance. Griswold[180] developed a split-pin device. Peeso[330] developed the telescope crown and his version of the split-pin and tube retaining device. Naturally, such devices called for the "devitalization" of the teeth upon which these types of retaining devices were to be used. At the time these devices were becoming popular, some dentists began to question the practice of "devitalizing" healthy teeth so that these various retaining devices could be used.

During this time, numerous patented retaining devices were used. The Roach attachment, the Griswold attachment, the Condit attachment and others made their appearance.

Herman Chayes[104, 108] began to discuss the importance of preserving the health of the mouth tissues, and expressed his concern over the disregard that was shown to them by many of the dentists in the manner in which they replaced lost teeth. The search by dentists for a more hygienic type of bridgework resulted in the use of partial dentures rather than fixed bridgework.

Impetus was added to the use of partial dentures following the announcement by Nesbitt[313] that he had developed a new type of "removable bridgework" which could be constructed by the use of cast clasps.

Based largely upon the nature of the advertisements of the commercial laboratories, the Roach technic and the Akers technic became the leading methods.

During the latter portion of this period, various new chromium alloys began to appear; these also were advertised by the commercial laboratories. A large number of dentists will not use the chromium alloys because they frown upon a material which they cannot use in their laboratory.

The one-piece cast removable partial denture has replaced largely the use of the precision attachment type of partial denture.

The pride that the early dentist took in his fourteen-tooth fixed bridge has been replaced midway in the century by the pride that the dentist takes today in the manner in which he can conserve tooth structure and preserve the health of the oral tissues.—*Frederick C. Elliott, D.D.S.*

Full Dentures

The two large volumes of progress in full denture construction during the first half of the twentieth century must be written here in a few words.

At the turn of the century, the principal interest was in impressions. The procedures in use at that time were inadequate because they were empirical technics. The procedures of today are improved because of two factors. First, there is a better understanding of the anatomy and physiology of the supporting and limiting structures involved; second, the materials and their methods of use have been improved.

Little thought was given to occlusion in the nineteenth century, but with the beginning of the twentieth century, it was recognized as a major factor in successful dentures. Jaw relations were studied, and jaw movements were analyzed. This showed the inadequacy of the existing articulators. A flood of articulators was developed. Some were built to record jaw movements or jaw positions, and others were built to conform to theories of occlusion. From these a few have remained on the scene to serve the profession.

Posterior tooth forms were inefficient as cutting instruments. Teeth have been produced which are efficient and which can be arranged in bilateral balance to aid in stability of dentures. Other teeth have been carved which eliminate all cuspal interference and are yet efficient. Teeth are being made of some of the newer plastics. These allow easy modification and are less likely to break, but are subject to wear. The early teeth were poor esthetically. The anterior tooth forms and color have been so greatly improved that the appearance of artificial teeth can be so natural as to defy detection. The classification of tooth forms into related groups has simplified the selection of teeth. The addition of opal glass to porcelain increased the lifelike appearance of teeth by adding translucency.

Vulcanite has been practically eliminated as a denture base material. The present plastic denture base materials are lifelike in appearance, color-fast, and have great strength.

Other materials and methods have kept pace with those mentioned above. Great impetus was given to the study of materials by the American Dental Association Council on Research and the Research Fellowship in cooperation with the U. S. Bureau of Standards.

The advances made in full denture construction are characterized by a change from the purely mechanical to the mechanical in relation to the biologic factors. Prosthetists are now concerned with oral pathology, nutrition and endocrinology, as well as with mechanics, physics, technics, and materials.[120, 138, 277, 385, 396, 397, 404, 407, 426, 450, 472]—*Carl A. Boucher, D.D.S.*

A BIBLIOGRAPHY

The bibliographic references which follow are keyed numerically to the text of the section on Advances in Dental Science. The 500 references represent the story of the steady progress in dental science in the last 50 years. They are arranged in rough alphabetical order for purposes of convenience and it is hoped that in this form they will constitute a useful bibliographic review.

1. Adair, F. E., and Hermann, J. B., The Use of Testosterone Propionate in the Treatment of Advanced Carcinoma of the Breast. *Ann. Surg.* 123:1023 (June) 1946.

2. Adams, W. C., Significance of the Blood Count in Oral Infections. *D. Cosmos* 70:314 (Mar.) 1928.

3. Albrecht, W. A., Our Teeth and Our Soils. *Ann. Dent.* 6:190 (Dec.) 1947.

4. American Association for the Advancement of Science, Symposium on Dental Caries. *J.A.D.A.* 37:379 (Oct.) 1948.

5. The American Board of Oral Pathology, Editorial. *Oral Surg., Oral Med., Oral Path.* 2:407 (April) 1949.

6. Board of Oral Surgery: Fundamental Requirements in Training in Oral Surgery. *J.A.D.A.* 39:450 (Oct.) 1949.

7. Editorial: Specialties in Dentistry, Requirements for Certification by the American Board of Oral Surgery. *J.A.D.A.* 34:548 (April 15) 1947.

8. Andrews, R. R., The Vitality of the Dental Enamel. *J.A.M.A.* 53:280, 1909.

9. Angle, E. H., Classification of Malocclusion. *D. Cosmos* 41:350 (April) 1899.

10. *Annual Reviews of Biochemistry*, vols. 6-17, 1936-48.

11. Applebaum, E., The Radiopaque Surface Layer of Enamel and Caries. *J. D. Res.* 19:41 (Feb.) 1940.

12. Applebaum, E., and Cuttita, J. A., Development of the Head Illustrated by Sections of Human Fetal Material. *Am. J. Orthodont. & Oral Surg.* (*Oral Surg. Sect.*) 32:327, 1946.

13. Applebaum, E.; Hollander, F., and Bodecker, C. F., Normal and Pathological Variations in Calcification of Teeth as Shown by the Use of Soft X-Rays. *D. Cosmos* 75:1097 (Nov.) 1933.

14. Appleton, J. L. T., *Bacterial Infection*, ed. 3, Philadelphia: Lea and Febiger, 1944.

15. Appleton, J. L. T.; Klein, H., and Palmer, C. E., Method for Measuring Rate of Elimination of Bacteria from the Human Mouth. *Am. J. Hyg.* 28: 213 (Sept.) 1938.

16. Archer, W. H., General Anesthesia Under War Conditions. *J.A.D.A.* 30:1547 (Oct.) 1943.

17. Arnold, F. A., The Production of Carious Lesions in Molar Teeth of Hamsters (C. auratus). *Pub. Health Rep.* 57:1599 (Oct. 23) 1942.

18. Aschoff, L., and Koch, W., "*Skorbut.*" Jena: Gustav Fisher, 1919.

19. Ast, D. B., The Caries-Fluorine Hypothesis and a Suggested Study to Test Its Application. *Pub. Health Rep.* 58:857 (June 4) 1943.

20. Baker, J. R., *The Discovery of the Uses of Colouring Agents in Biological Micro-technique.* London: Williams and Norgate, 1945.

21. Barnes, M. N., and Bibby, B. G., Summary of Reports and a Bacteriologic Study of Infections Caused by Human Tooth Wounds. *J.A.D.A.* 26:1163 (July) 1939.

22. Bartlett, M. K.; Jones, C. M., and Ryan, A. E., Vitamin C and Wound Healing. *New England J. Med.* 226:469 (March) 1942.

23. Baume, L. J., Paradentosis and Growth Hormone. *Paradentologie* 3:147 (Dec.) 1949.

24. Baume, L. J., Physiological Tooth Migration and Its Significance for the Development of Occlusion, I to IV, *J. D. Res.* (in press).

25. Beall, J. R., and Caul, H. J., "Liners" for dentures. *J.A.D.A.* 33:304 (March) 1946.

26. Beck, C., Errors Caused by False Interpretation of the Roentgen Rays, and Their Medico-legal Aspects. *Internat. D. J.* 21:709 (Nov.) 1900.

27. Becks, H., Dangerous Effect of Vitamin D Overdosage on Dental and Paradental Structures. *J.A.D.A.* 29:1947 (Nov.) 1942.

28. Becks, H., Fourth Dental Medicine Seminar, (Editorial) *Oral Surg., Oral Med. & Oral Path.* 1:151 (Jan.) 1948.

29. Becks, H., The Physical Consistency of Food and Refined Carbohydrate Restrictions—Their Effect on Caries. *J. D. Res.* 27:405 (June) 1948.

30. Becks, H., Systemic Background of Paradentosis. *J.A.D.A.* 28:1447 (Sept.) 1941.

31. Becks, H.; Collins, D. A., and Freytag, R. M., Changes in Oral Structures of Dog Persisting After Chronic Overdoses of Vitamin D. *Am. J. Orth. & O. Surg.* 32:463 (Aug.) 1946.

32. Becks, H.; Collins, D. A.; Simpson, M., and Evans, H. M., Changes in the Central Incisors of Hypophysectomized Female Rats After Different Postoperative Periods. *Arch. Path.* 41:457 (May) 1946.

33. Becks, H.; Jensen, A. L., and Millarr, C. B., Rampant Dental Caries: Prevention and Prognosis; A Five Year Clinical Survey. *J.A.D.A.* 31:1189 (Sept.) 1944.

34. Becks, H., and Morgan, A. F., The Effect of Deficiencies of the Filtrate Fraction of the Vitamin B Complex and of Nicotinic Acid on Teeth and Oral Structures. *J. Period.* 13:18 (Jan.) 1941.

35. Becks, H., and Ryder, W. B., Experimental Rickets and Calcification of Dentin. *Arch. Path.* 12: 358 (Sept.) 1931.

36. Becks, H.; Wainwright, W. W., and Morgan, A. F., Comparative Study of Oral Changes in Dog Due to Deficiencies of Pantothenic Acid, Nicotinic Acid, and Unknowns of B Vitamin Complex. *Am. J. Orth. & Oral Surg.* 29:183 (April) 1943.

37. Beckwith, T. D., Darkfield Microscope in Pyorrhea and Oral Infections. *J.A.D.A.* 12:1298 (Oct.) 1925.

38. Belding, P. H., and Belding, L. J., Diet, Bacteria and Disease. *D. Items Interest* 62:303 (April) 1940.

39. Bellinger, D. H., Preliminary Report on the Use of Tantalum in Maxillofacial and Oral Surgery. *J. Oral Surg.* 5:108 (April) 1947.

40. Bernier, J. L., *Manual for the Differential Diagnosis of Oral Lesions.* St. Louis: C. V. Mosby Co., 1943.

41. Burket, L. W., *Oral Medicine; Diagnosis, Treatment.* Philadelphia: J. B. Lippincott Co., 1946.

42. Burket, L. W., and Burns, C. G., Bacteremias Following Dental Extractions. *J. D. Res.* 16:521-30 (Dec.) 1937.

43. Bernier, J. L., Evaluation of the Biopsy as a Diagnostic Aid. *Am. J. Orth.* (*Oral Surg. Sect.*) 32: 531 (Sept.) 1946.

44. Bernier, J. L., and Kaplan, H., The Repair of Gingival Tissue After Surgical Intervention. *J.A.D.A.* 35:697 (Nov.) 1947.

45. Bibby, B. G., Effectiveness of Various Fluoride Preparations in Reducing Tooth Solubility. *J. D. Res.* 23:202 (June) 1944.

46. Bibby, B. G., New Approach to Caries Prophylaxis: Preliminary Report on Use of Fluoride Applications, *Tufts D. Outlook* 15:4 (May) 1940.

47. Bibby, B. G., Use of Fluorine in the Prevention of Dental Caries, I. Rationale and Approach. *J.A.D.A.* 31:228 (Feb.) 1944.

48. Bibby, B. G., Use of Fluorine in the Prevention of Dental Caries, II. Effect of Sodium Fluoride Applications. *J.A.D.A.* 31:317 (March) 1944.

49. Bibby, B. G., and Berry, G. P., Cultural Study of Filamentous Bacteria Obtained from Human Mouth. *J. Bact.* 38:763, 1939.

50. Bibby, B. G.; Hine, M. K., and Clough, O. W., Antibacterial Action of Human Saliva. *J.A.D.A.* 25: 1290 (Aug.) 1938.

51. Bibby, B. G., and Knighton, H. T., Actinomyces of Human Mouth. *J. Infect. Dis.* 69:148, 1941.

52. Bibby, B. G., and Van Huysen, G., Changes on the Enamel Surface, a Possible Defense Against Caries. *J.A.D.A.* 20:828 (May) 1933.

53. Billings, F., Focal Infection; *The Lane Medical Lectures*, New York: D. Appleton-Century Company, Inc., 1936.

54. Black, A. D., Roentgenographic and Microscopic Studies of Tissues Involved in Chronic Mouth Infections. *J.A.M.A.* 49:599, 1917.

55. Black, G. V., The Physical Properties of the Silver-Tin Amalgams. *D. Cosmos* 38:965 (Dec.) 1896.

56. Black, G. V., Practical Utility of Accurate Studies of the Physical Properties of the Teeth and of Filling-materials. *D. Cosmos* 38:296 (April) 1896.

57. Black, G. V., An Investigation of the Physical Characters of the Human Teeth in Relation to Their Diseases and to Practical Dental Operations, Together With the Physical Characteristics of Filling-materials. *D. Cosmos* 37:333 (May) 1895.

58. Black, G. V., *Operative Dentistry*, Chicago, Medico-Dental Publishing Company, 1908.

59. Black, R. B., Technic for Nonmechanical Preparation of Cavities and Prophylaxis. *J.A.D.A.* 32:955 (Aug.) 1945.

60. Blackwell, R. E., The Function of the Operative Dentist in Conserving Teeth and Health. *Proc. Dent. Centenary Celebration*, 1940, pp. 159-165.

61. Blackwell, R. E., *G. V. Black's Work on Operative Dentistry*, ed. 8. Woodstock, Ill., Medico-Dental Publ. Co., 1947.

62, 63. Blayney, J. R., Dental Education and the International Association for Dental Research. *J. D. Res.* 28:627 (Dec.) 1949.

64. Blayney, J. R., Present-day Evaluation of the Pulpless Tooth. *J.A.D.A.* 23:533 (April) 1936.

65. Bodecker, C. F., and Applebaum, E., Effect of Filling Materials upon Teeth. *D. Cosmos* 72:1001 (Oct.) 1930.

66. Bodecker, C. F., Enamel Proteolysis: An Important Factor in Dental Caries. *New York J. Den.* 18:254 (Aug.-Sept.) 1948.

67. Bodecker, C. F., Nutrition of the Enamel of the Human Tooth. *D. Cosmos* 53:1000 (Sept.) 1911.

68. Bodecker, C. F., Percussion in Dental Diagnosis. *D. Cos.* 47:208 (Feb.) 1905.

69. Bodecker, C. F., The Illusory Sheath of Neumann in Dentin. *J. D. Res.* 26:53 (Feb.) 1947.

70. Bodecker, C. F., *The Metallic Inlay*, Berlin, Herman Musser, 1911.

71. Boyle, P. E., The Effects of Vitamin A Deficiency on the Periodontal Tissues. *Am. J. Orth. & Oral Surg.* (*Sect. Oral Surg.*) 33:744 (Oct.) 1947.

72. Boyle, P. E., Manifestations of Vitamin A Deficiency in a Human Tooth-germ. *J. D. Res.* 13:39 (Feb.) 1933.

73. Boyle, P. E.; Hillier, J., and Davidson, N. R., Preliminary Observations of the Enamel of Human and Guinea Pig Teeth Using the Electron Microscope. *J. D. Res.* 25:156 (June) 1946.

74. Brauer, J. C.; Higley, L. B.; Massler, M., and Schour, I., *Dentistry for Children*. Philadelphia: Blakiston Co., 1947.

75. Breitner, C., Bone Changes Resulting from Experimental Orthodontic Treatment. *Am. J. Orth. & Oral Surg.* (*Sect. Orth.*) 26:521 (June) 1940.

76. Brekhus, P. J.; Armstrong, W. D., and Simon, W. J., Stimulation of the Muscles of Mastication. *J. D. Res.* 20:87 (April) 1941.

77. Bremner, M. D. K., *The Story of Dentistry*, ed. 2. Brooklyn: Dental Items of Interest, 1946.

78. Broadbent, B. H., The Face of the Normal Child. *Angle Orthodont.* 7:183, 1937.

79. Broadbent, B. H., A New X-ray Technique and Its Application to Orthodontia. *Angle Orthodont.* 1: 45, 1931.

80. Broadbent, B. H., *Ontogenetic Development of Occlusion*. Philadelphia: University of Pennsylvania Press, 1941.

81. Brodie, A. G., On the Growth of the Jaws and Eruption of the Teeth. *Angle Orthodont.* 12:109 (July) 1942.

82. Brodie, A. G., On the Growth Pattern of the Human Head from the Third Month to the Eighth Year of Life. *Am. J. Anat.* 68:209 (March) 1941.

83. Bronner, F. J., Engineering Principles Applied to Class 2 Cavities. *J. D. Res.* 10:115, 1930.

84. Bronner, F. J., Hand Instrumentation in Operative Procedure. *J.A.D.A.* 17:1124 (June) 1930.

85. Bronner, F. J., Is There a Common Basis for All Systems of Inlay Preparations? *D. Cosmos* 74:1085 (Nov.) 1932.

86. Bronner, F. J., Some Studies on Pulp and Dentin Reactions. *D. Cosmos* 74:535 (June) 1932.

87. Broomell, I. N., The Calcification of Dentin and Enamel, and Its Relation to Hypersensitiveness in These Tissues. *Dental Brief* 7:505 (June) 1902.

88. Broomell, I. N., The Histology of Cementum. *D. Cosmos* 40:697 (Sept.) 1898.

89. Brown, R. K., Present-day Trends in Operative Dentistry. *J.A.D.A.* 30:1399 (Sept.) 1943.

90. Bryans, W. J., Principles of the Open Methods of Extraction. *Am. J. Orth. & Oral Surg.* (*Oral Surg. Sect.*) 28:326 (June) 1942.

91. Bunting, R. W., *Oral Pathology*, Philadelphia: Lea & Febiger, 1929.

92. Bunting, R. W., Dental Education and the Future of Dentistry. *J.A.D.A.* 34:581 (May) 1947.

93. Bunting, R. W., Studies of the Relation of Bacillus Acidophilus to Dental Caries. *J. D. Res.* 8:229 (April) 1928.

94. Bunting, R. W.; Crowley, Mary; Hard, Dorothy G. and Keller, Margaret, The Prevention of Dental Caries Through the Limitation of the Growth of Bacillus Acidophilus in the Mouth. *J.A.D.A.* 16:224 (Feb.) 1929.

95. Burket, L. W., Modern Aspects of Hygiene, Histology and Oral Diagnosis. *J. Penn. S. D. Soc.* 11: 88-96 (Dec.) 1943.

96. Burket, L. W., *Oral Medicine; Diagnosis, Treatment*, Philadelphia: J. B. Lippincott Co., 1946.

97. Cahn, L. R., *Pathology of the Oral Cavity*, Baltimore: Williams & Wilkins Co., 1941.

98. Cahn, L. R., and Bartels, H. A., Value of the Laboratory in Oral Diagnosis. *Ann. Dent.* 5:41 (June-Sept.) 1946.

99. Cameron, J. R., Selecting a Suitable Anesthetic Agent for Exodontia and Oral Surgery. *Anesth. and Analg.* 18:278 (Sept.-Oct.) 1939.

100. Cape, A. T., and Kitchin, P. C., Histologic Phenomena of Tooth Tissues as Observed Under Polarized Light. *J.A.D.A.* 17:193, 1930.

101. Capon, W. A., *Porcelain Dental Restorations*, Philadelphia: Lea & Febiger, 1920.

102. Carver, L. F., Treatment of Leukemia by Radioactive Phosphorus. *Bull. New York Acad. Med.* 18:254, 1942.

103. Cecil, R. L., (cited by Reimann, H. A., and Havens, W. P.) Focal Infection and Systemic Disease: A Critical Appraisal; Case Against Indiscriminate Removal of Teeth and Tonsils. *J.A.M.A.* 114:1 (Jan. 6) 1940.

104. Chayes, H. E. S., A Broad Consideration of the Principles Involved in Fixed and Removable Bridgework. The Parallelism of Abutments and Attachments, and Instruments for Obtaining the Same. *D. Cosmos* 57:783 (July) 1915.

105. Chayes, H. E. S., *Technic and Scope of Cast Gold and Porcelain Inlays*. St. Louis: C. V. Mosby Company, 1918.

106. Chayes, H. E. S., Endocrinodontia, or the Ductless Glands—Their Expression in the Human Mouth. *Int. J. Orthodont.* 4:120 (March) 1918.

107. Chayes, H. E. S., Endocrinodontia, or the Ductless Glands—Their Expression in the Human Mouth. *Int. J. Orthodont.* 4:177 (April) 1918.

108. Chayes, H. E. S., Removable Bridgework by the Use of the Single-bar Double-lock Attachment. *D. Cosmos* 50:271 (March) 1908.

109. Chittenden, R. H., The Development of Physiological Chemistry in the United States. American Chemical Society. The Chemical Catalogue Co., 1930.

110. Clark, C. A., Interpretation of Radiographs with Special Reference to Periodontal Disease. *Brit D. J.* 35:69, 1914.

111. Clough, O. W., Inhibition of Bacterial Growth by Human Saliva. *J. D. Res.* 14:164 (June) 1934.

112. Cochran, G. W., Plea for More Thoroughness in Diagnosis. *D. Items Interest* 29:381 (May) 1907.

113. Coleman, R. L., Physical Properties of Dental Materials, Research Paper No. 32, Nat. Bur. of Standards, 1928.

114. Coller, F. A., and Yglesias, L., The Relation of the Spread of Infection to Fascial Planes in the Neck and Thorax. *Surgery* 1:323 (March) 1937.

115. Comroe, B. I.; Collins, L. H., and Crane, M. P., *Internal Medicine in Dental Practice*, Philadelphia: Lea & Febiger, 1942.

116. Comroe, B. I.; Collins, L. H., and Crane M. P., *Internal Medicine in Dental Practice*, Philadelphia: Lea & Febiger, 1949.

117. Cotton, H. A., The Relation of Oral Infection to Mental Diseases. *J. D. Res.* 1:269 (Sept.) 1919.

118. Coy, H. D., Simplified Inlay Casting. *J.A.D.A.* 22:434 (March) 1935.

119. Crandon, J. H.; Lund, C. C., and Dill, D. B., Experimental Human Scurvy, *New England J. Med.* 223:353 (Sept.) 1940.

120. Crawford, J. W., Esthetics. *J.A.D.A.* 11:985 (Oct.) 1924.

121. Cresson, J., Suggested Revision of Testing Dental Elastic Impression Materials. *J. D. Res.* 28:573 (Dec.) 1949.

122. Crowell, D. C.; Hodge, H. C., and Line, W. R., Chemical Analysis of Tooth Samples Composed of Enamel, Dentine and Cementum. *J. D. Res.* 14:251 (Aug.) 1934.

123. Cryer, M. H., Some Uses of the Roentgen-rays in Studies of the Internal Anatomy of the Face. *D. Cosmos* 47:1 (Jan.) 1905.

124. *Cumulative Index Medicus*, Chicago: American Medical Association, 1922.

125. Davis, W. C., Present-day Operative Dentistry and Its Future. *D. Outlook* 24:70 (Feb.) 1937.

126. Dawson, C. E., and Blagg, W., The Effect of Human Saliva Upon the Cholera Vibrio in Vitro. *J. D. Res.* 27:547 (Oct.) 1948.

127. Dean, H. T., Endemic Fluorosis and Its Relation to Dental Caries. *Pub. Health Rep.* 53:1443, 1938.

128. Dean, H. T., Some Aspects of the Dental Research Problem. *The Military Surgeon* 106:27 (Jan.) 1950.

129. Dean, H. T., A Summary of the Epidemiology of Chronic Endemic Dental Fluorosis (Mottled Enamel). *Texas D. J.* 55:86 (March) 1937.

130. Dean, H. T.; Jay, P.; Arnold, F. A., Jr.; McClure, F. J., and Elvove E., Domestic Water and Dental Caries, Including Certain Epidemiological Aspects of Oral Lactobacillus Acidophilus. *Pub. Health Rep.* 54:1862 (May 26) 1939.

131. Dean, H. T.; Jay, P.; Arnold, F. A., Jr., and Elvove, E., Domestic Water and Dental Caries. *Pub. Health Rep.* Part I, 56:565 (Feb. 28) 1941; Part II, 56:761 (April 11) 1941.

132. Dean, H. T.; Arnold, F. A., and Elvove, E., Domestic Water and Dental Caries, Part V. *Pub. Health Rep.* 57:1155 (Aug. 7) 1942.

133. Deakins, M., Changes in the Ash, Water, and Organic Content of Pig Enamel During Calcification. *J. D. Res.* 21:429 (Oct.) 1942.

134. Gies, W. J., *Dental Education in the United States and Canada*. New York: The Carnegie Foundation for the Advancement of Teaching, 1926.

135. Dental Medicine, Editorial, *Oral Surg., Oral Med. & Oral Path.* 1:151 (Feb.) 1948.

136. Dingman, R. O., Osteotomy for Correction of Mandibular Malrelation of Developmental Origin. *J. Oral Surg.* 2:239 (July) 1944.

137. Esalick, K., *Dental Caries Mechanism and Present Control Technics as Evaluated at the University of Michigan Workshop*. St. Louis: C. V. Mosby Co., 1948.

138. Edwards, L. F., and Boucher, C. O., Anatomy of the Mouth in Its Relation to Complete Dentures. *J.A.D.A.* 29:331 (March) 1942.

139. Eisenbrandt, L. L., Studies on the Oxidation Reduction Potentials of Saliva. *J. D. Res.* 24:247 (Oct.) 1945.

140. Eliot, M. M.; Souther, S. P.; Anderson, B. G., and Arnim, S. S., A Study of the Teeth of a Group of School Children Previously Examined for Rickets. *Am. J. Dis. Child.* 48:713 (Oct.) 1934.

141. Elvehjem, C. A.; Madden, R. J.; Strong, F. M., and Wooley, D. W., Relation of Nicotinic Acid to Canine Blacktongue. *J. Am. Chem. Soc.* 59:1767 (Sept.) 1937.

142. Engel, M. B., Glycogen and Carbohydrate-Protein Complex in Developing Teeth of Rat. *J. D. Res.* 27:681 (Dec.) 1948.

143. Ennis, L. M., *Dental Roentgenology*, ed. 3. Philadelphia: Lea & Febiger, 1939.

144. Ennis, L. M., Utilization of Radiopaque Solutions in Determining Final Interpretations of Oral Lesions. *J.A.D.A.* 19:918 (June) 1932.

145. Ennis, L. M., and Berry, H. M., Jr., Ossifying Periapical Fibroma: Roentgenographic Studies. *J.A.D.A.* 37:642 (Dec.) 1948.

146. Erdheim, J., Rachitis und Epithelkörperchen, *Denkschr. Math. Naturw. Klasse Wien* 90:363, 1914.

147. Erdheim, J., Zur Kenntnis der parathyreopriven dentin-veranderung. *Frankfurt. Ztschr. f. Path.* 7:238, 1911.

148. Esterman, M. F., Roentgenographic Findings in 290 Partially Edentulous or Edentulous Mouths. *D. Cosmos* 63:901 (Sept.) 1921.

149. DeFord, W. H.; Henahan, J. B.; Thoma, K. H., and Jackman, W. T., Possibility of Eliminating Pain from Dental Operations (Symposium). *J. Nat. D. A.* 2:193 (Aug.) 1915.

150. Fibiger, J., The Report of the Committee on Cancer in Denmark. *Ugesk. f. Laeger*, Kobenh., 71: 1091-1096, 1909.

151. Finn, S. B., and Ast, D. B., The Lactobacillus Counts: Newburgh-Kingston Fluorine Demonstration. *Science* 106:292 (Sept. 26) 1947.

152. Fish, E. W., *An Experimental Investigation of Enamel, Dentine and the Dental Pulp*. London: Bale, Sons & Danielsson, 1933.

153. Fischer, G., and Riethmuller, R. H., Local Anesthesia in Dentistry. Philadelphia: Lea & Febiger, 1914.

154. Felcher, F. R., *The Art of Porcelain in Dentistry*. St. Louis: C. V. Mosby Co., 1932.

155. Folds, F. F., Anesthesia Considerations in Oral Surgery and Dentistry. *Am. J. Orth. & Oral Surg. (Oral Surg. Sect.)* 33:379 (Sept.) 1947.

156. Fosdick, L., Control Effect of Tooth Brushing on Caries Incidence Immediately After Eating. *J.A.D.A.* 40:133 (Feb.) 1950.

157. Fosdick, L., The Degradation of Sugars in the Mouth and the Use of Chewing Gum and Vitamin K in the Control of Dental Caries. *J. D. Res.* 27:235 (April) 1948.

158. Frisbie, H., and Nuckolls, J., Caries of the Enamel. *J. D. Res.* 26:181 (June) 1947.

159. Gabel, A. B., *American Textbook of Operative Dentistry*, ed. 8. Philadelphia: Lea and Febiger, 1947.

160. Gabel, A. B., and Smith, E. H., Flow of Methyl Methacrylates. *J. D. Res.* 22:237 (Aug.) 1943.

161. Garretson, J. E., *A System of Oral Surgery*, ed. 2. Philadelphia: J. B. Lippincott, 1873.

162. Garrison, L. H., The Effect of Fever on the Development of the Rat Incisor. *J. D. Res.* 18:259 (June) 1939.

163. Gies, W. J., *Dental Education in the United States and Canada*. New York: Carnegie Foundation for the Advancement of Teaching, 1926.

164. Gillman, I., et al., A Preliminary Report on Hydrocephalus, Spina Bifida and Other Congenital Anomalies in the Rat Produced by Trypan Blue. *S. Afr. J. Med. Sc.* 13:47, 1948.

165. Gilmore, T. L., Chronic Oral Infections. *Arch. Int. Med.* 9:499, 1912.

166. Glaistone, S., Development of Tooth Germs in Vitro. *J. Anat.* 70:260 (Jan.) 1936.

167. Goadby, K. W., *Mycology of the Mouth*. London: Longmans, Green Co., 1902.

168. Gottlieb, B., *Dental Caries*. Philadelphia: Lea and Febiger, 1947.

169. Gottlieb, B., Der Epithelansatz am Zahne. *Deut. Monatschr. F. Zahrn.* 39:142, 1921.

170. American Dental Association, Council on Dental Education, *Requirements for the Approval of a Dental School*. Chicago: 1941.

171. Gillett, H. W., and Irving, A. J., *Gold Inlays by the Indirect System*. Brooklyn: Dental Items of Interest Publishing Company, 1932.

172. Glaser, R. J., et al., Effect of Penicillin on Bacteremias Following Dental Extraction. *Am. J. Med.* 4:55 (Jan.) 1948.

173. Goldberger, J., *Public Health Rep.* 29:1684, 1914.

174. Gordon, S. D., Wire Suturing in the Treatment of Facial Fractures. *Canad. M. A. J.* 48:406 (May) 1943.

175. Goslee, H. J., The Partial Denture Problem: Fixed Bridgework. *J.A.D.A.* 14:315 (Feb.) 1927.

176. Gottlieb, B., Details on Impregnation for Caries Prophylaxis According to the Latest Knowledge and Experience. *Texas D. J.* 67:51 (Feb.) 1949.

177. Gottlieb, B., A New Concept of the Caries Problem and Its Clinical Application, Part I. *J.A.D.A.* 31:1489 (Nov.) 1944.

178. Greep, R. O.; Fischer, C. J., and Morse, Anna, Alkaline Phosphatase in Odontogenesis and Osteogenesis and Its Histochemical Demonstration After Demineralization. *J.A.D.A.* 36:427 (June) 1948.

179. Grieves, C. J., Infections Resulting from Lowered Vitality, Caused by Unhygienic Mouths. *D. Cosmos* 45:1102, 1913.

180. Griswold, W. E., A System of Removable Bridgework. *D. Cosmos*. 43:33 (Jan.) 1901.

181. Grossman, L. I., Present Status of the Pulpless Tooth. *Ann. Int. Med.* 13:1803 (April) 1940.

182. Grossman, L. I., *Root Canal Therapy*, ed. 3. Philadelphia: Lea and Febiger, 1950.

183. Grove, C. J., and Grove, C. T., Chemical Study of Human Saliva Indicating that Ammonia Is an Immunizing Factor in Dental Caries. *J.A.D.A.* 22: 247 (Feb.) 1935.

184. Gurley, W. B., and Van Huysen, Histologic Response of Teeth of Dogs to Operative Procedure. *J. D. Res.* 19:192, 1940.

185. Haddow, A., and Kon, G. A. R., Chemistry of Carcinogenic Compounds. *Brit. M. Bull.* 4:314, 1947.

186. Haddow, A., and Paterson, E., Urethane in Leukemia. *J.A.M.A.* 136:643 (Feb.) 1948.

187. Haddow, A.; Watkinson, J. M., and Paterson, E., Influence of Synthetic Oestrogens Upon Advanced Malignant Disease. *Brit. M. J.* 2:393 (Sept.) 1944.

188. Haden, R. L., Dental Infection and Systemic Disease. Philadelphia: Lea & Febiger, 1928, 1936.

189. Hadley, F. P., A Quantitative Method for Estimating B. Acidophilus in Saliva. *J. D. Res.* 13:415 (Oct.) 1933.

190. Hahn, W. E., The Capacity of Developing Tooth Germ Elements for Self-differentiation When Transplanted. *J. D. Res.* 20:5 (Feb.) 1941.

191. Hall, C. B., Statement on Direct Resinous Filling Materials. *J.A.D.A.* 40:243 (Feb.) 1950.

192. Hamisfar, M. D., Biology, Microscopy and Clinical Chemistry as Prime Factors in Scientific Diagnosis. *Western D. J.* 15:505 (Nov.) 1901.

193. Hampp, E. G., Morphologic Characteristics of the Smaller Oral Treponemes and Borrelia Vincenti as Revealed by Stained Smear, Darkfield and Electron Microscope Technics. *J.A.D.A.* 40:1 (Jan.) 1950.

194. Hampp, E. G., Observations on the Oral Spirochetal Flora Present in Vincent's Infection. *Am. J. Pub. Health.* 35:441 (May) 1945.

195. Hampp, E. G., Morphologic Characteristics of the Smaller Oral Treponemes and Borrelia Vincenti as Revealed by Stained Smear, Darkfield and Electron Microscope Technics. *J.A.D.A.* 40:1 (Jan.) 1950.

196. Harris, L. W., Applications of Acrylics in Operative Dentistry. *J.A.D.A.* 30:553 (April) 1943.

197. Garrison, F. H., *Introduction to the History of Medicine*. Philadelphia: W. B. Saunders, 1929.

198. Harrison, R., Embryonic Transplantation and Development of Nervous System. *Anat. Rec.* 2:385, 1908.

199. Harrison, R. W., Studies on Lactobacilli. *J. Infect. Dis.* 65:142, 1939.

200. Harrow, B., *Textbook of Biochemistry*, ed. 4. Philadelphia: W. B. Saunders, 1946.

201. Hartzell, T. B., Advantages of Modern Methods of Diagnosis for the Dentist. *D. Cosmos* 64:435 (April) 1922.

202. Hartzell, T. B., Secondary Infections Having Their Primary Origin in the Oral Cavity. *J. Allied D. Soc.* 9:166 (June) 1914.

203. Hellman, M., Changes in the Human Face Brought About by Development. *Int. J. Orthodont.* 13:475 (June) 1927.

204. Hellman, M. Introduction to the Growth of the Human Face From Infancy to Adulthood. *Int. J. Orth. & Oral Surg.* 18:777 (Aug.) 1932.

205. Henschel, C. J., Caries Control by Chemical Prophylaxis. *N. Y. J. Dent.* 16:102 (March) 1946.

206. Hervesy, G. C., and Armstrong, W. D., Exchange of Radiophosphate by Dental Enamel. *Proc. Am. Soc. Biol. Chem.* 133:44, 1940.

207. Hervesy, G. C.; Holtz, J. J., and Krogh, A., Kgl. Danske Vidensk. Selsk, *Biol. Medd.* 13:1, 1937.

208. Higley, L. B., Practical Application of a New and Scientific Method of Producing Temporomandibular Roentgenograms. *J.A.D.A. & D. Cosmos* 24:922 (Feb.) 1937.

209. Higley, L. B., The Proper Time to Begin Orthodontic Treatment. *J.A.D.A.* 30:1329 (Sept.) 1943.

210. Hill, T. J., The Influence of Saliva Upon the Growth of Oral Bacteria. *J. D. Res.* 18:214 (June) 1939.

211. Hill, T. J., The Use of Penicillin in Dental Caries Control. *J. D. Res.* 27:259 (April) 1948.

212. Hill, T. J., and Kniesner, A. H., Nutritional Requirements of the Oral Lactobacilli. *J. D. Res.* 21:467 (Oct.) 1942.

213. Hine, M. K., and Berry, G. P., Morphological and Cultural Studies of Genus Fusiformis. *J. Bact.* 34: 517, 1937.

214. Hodge, H. C., Microhardness Studies of Transparent Dentin. *Brit. D. J.* 63:181 (Aug. 16) 1937.

215. Hodge, H. C.; LeFevre, M., and Bale, W. F., Chemical and X-Ray Diffraction Studies of Calcium Phosphates. *Ind. and Eng.-Chem. Analy. ed.* 10:156, 1938.

216. Hodge, H. C., and McKay, H., The Microhardness of Teeth. *J.A.D.A.* 20:227 (Feb.) 1933.

217. Hoffman, W. S., Penicillin: Its Use and Possible Abuse. *J.A.D.A.* 34:89 (Jan.) 1947.

218. Hollenback, G. M., Precision Gold Inlays Made by a Simple Technic. *J.A.D.A.* 30:99 (Jan.) 1943.

219. Holman, W. L., Focal Infection and "Elective Localization"; Critical Review. *Arch. Path. and Lab. Med.* 5:68, 1928.

220. Horner, H., *Dental Education Today*, Chicago: The University of Chicago Press, 1947.

221. Hovestad, J. F., *Practical Dental Porcelains*. St. Louis: C. V. Mosby Co., 1924.

222. Howe, P. R., Food Accessory Factors in Relation to the Teeth. *J. D. Res.* 3:7 (March) 1921.

223. Howe, P. R., Further Studies of the Effect of Diets Upon the Teeth and Jaws. *J.A.D.A.* 9:55 (Jan.) 1922; 10:201 (March) 1923.

224. Huggins, C., Effect of Orchiectomy and Irradiation on Cancer of Prostate. *Ann. Surg.* 115:1189, 1942.

225. Hume, L. B., Observations on the Endocrines, Metabolism and Dental Disease. *Austral. D. J.* 5:19 (Jan.) 1933.

226. Hunt, A. H., Role of Vitamin C in Wound Healing. *Brit. J. Surg.* 28:436, 1941.

227. Hunter, W., The Role of Sepsis and Antisepsis in Medicine. *Lancet*, London, Jan. 14, 1911; *D. Cosmos* 60:585 (July) 1918.

228. Hyatt, T. P., *Prophylactic Odontotomy*, New York: The Macmillan Co., 1933.

229. *Index to Dental Periodical Literature*, 1901-1905. Buffalo, N. Y., Dental Index Bureau, 1931, p. 4 and pp. 64-67.

230. Irons, E. E., and Smith, F. M., *Proc. Chicago Inst. of Med.*, 16:38, 1946.

231. Ivy, R. H., A Review of the Recent Literature on Cleft Lip and Palate Surgery. *Int. J. Orthodont. and Oral Surg.* 23:844, 1937.

232. Ivy, R. H., Imperfections in the Diagnosis and Treatment of Pathologic Conditions of the Teeth and Jaws. *D. Cosmos* 54:272 (March) 1912.

233. Ivy, R. H., The Maxillofacial Surgery of the War as Applied to Civilian Practice. *D. Cosmos* 62: 825 (July) 1920.

234. Jacobs, H. G., and Jacobs, M. H., Aureomycin: Its Use in infections of the Oral Cavity. *Oral Surg., Oral Med., and Oral Path.* 2:1015 (Aug.) 1949.

235. Jay, P., *B. Acidophilus and Dental Caries*. *J.A.D.A.* 16:230 (Feb.) 1929.

236. Jay, P., Lactobacillus Acidophilus and Dental Caries. *Am. J. Pub. Health*, 28:759 (June) 1938.

237. Jay, P.; Hadley, Faith P.; Bunting, R. W., and Koehne, Martha, Observations on Relationship of Lactobacillus Acidophilus to Dental Caries in Children During Experimental Feeding of Candy. *J.A.D.A.* 23:846 (May) 1936.

238. Jay, P., The present Status of Caries Control Measures. *J. D. Res.* 27:413 (June) 1948.

239. Jeserich, P. H., Factors Necessary to Minimize Thermal Changes in Tooth Structures From Operative Procedures. *N. Y. J. Dent.* 5:275 (Dec.) 1935.

240. Johnson, C. N., A Few Considerations in Filling Teeth. *D. Cosmos.* 41:7 (Jan.) 1899.

241. Johnson, C. N., *Textbook of Operative Dentistry*, Philadelphia: P. Blakiston's Son and Co., 1908.

242. Jones, M. R., Our Changing Concept of an "Adequate" Diet in Relation to Dental Disease. *D. Cosmos* 77:535-549, 651-663, 747-763 (June) 1935.

243. Kane, L. W., The Role of Penicillin and Streptomycin in Oral Infections. *Am. J. Orth. & Oral Surg. (Oral Surg. Sect.)* 33:395, 1947.

244. Kauffmann, J. H., Prophylactic Odontotomy; Effective Procedures of Diminishing Prevalence of Dental Caries. *New York J. Den.* 15:56 (Feb.) 1945.

245. Kazanjian, V. H., Injuries of Face and Jaws Resulting from Automobile Accidents. *J.A.D.A.* 20: 757 (May) 1933.

246. Kazanjian, V. H., Observations on War Surgery of the Face and Jaws. *D. Cosmos* 62:283 (March) 1920.

247. Keith, A., and Campion, G. G., A Contribution to the Mechanism of Growth of the Human Face. *Int. J. Orthod., Oral Surg., and Radiol.* 8:607 (Oct.) 1922.

248. Kells, C. E., Stereoscopic Dental Skiagraphs. *D. Cosmos.* 54:745 (July) 1912.

249. Kesel, R. G., The Effectiveness of Dentifrices, Mouth Washes, and Ammonia-Urea Compounds in the Control of Dental Caries, in Easlick, *Dental Caries*. St. Louis: C. V. Mosby, 1948.

250. Kesel, R. G.; Kirch, E. R.; O'Donnell, J. F., and Wach, E. C., Recent Developments in the Biologic Production of Ammonia and the Use of Ammonia and Carbamide in Caries Prevention. *Oral Surg., Oral Med., & Oral Path.* 2:670 (May) 1949.

251. Kesel, R. G.; O'Donnell, J. F.; Kirch, E. R., and Wach, E. C., The Biological Production and Therapeutic Use of Ammonia in the Oral Cavity in Relation to Dental Caries Prevention. *J.A.D.A.* 33: 693 (June) 1946.

252. Keys, D. A., A Study in Casting Density. *J.A.D.A.* 32:25 (Jan.) 1945.

253. Kirk, E. C., A Contribution to the Study of Metabolism. *Trans. Dent. Soc. State of N. Y.* 1903, p. 73.

254. Kirk, E. C., The Nutritional Question as Related to Dental Pathology. *Dental Brief* 12:625 (Oct.) 1907.

255. Kirk, E. C., Two Cases of Infantile Scorbutus. *D. Cosmos.* 37:489 (June) 1895.

256. Kirkland, O., Oral Manifestations of Pellagra. *Internat. J. Orthodont.* 22:1172 (Dec.) 1936.

257. Kitchin, P. C., Some Observations on Enamel Development as Shown in the Mandibular Incisor of the White Rat. *J. D. Res.* 13:25 (Feb.) 1933.

258. Klein, H., Tooth Mortality and Socio-economic Status—Life Tables for Teeth. *J.A.D.A.* 30:80 (Jan.) 1943.

259. Kliger, L. J., A Biochemical Study and Differentiation of Oral Bacteria With Special Reference to Dental Caries. *J. Allied D. Soc.* 10:141 (June) 1915.

260. Kloehn, S. J., Guiding Alveolar Growth and Eruption of Teeth to Reduce Treatment Time and Produce a More Balanced Denture and Face. *Angle Orthodontist.* 17:10 (Jan.-April) 1947.

261. Kniesner, A. H., A Critical Review of the Newer Methods Proposed for the Reduction of Dental Caries. *J.A.D.A.* 40:154 (Feb.) 1950.

262. Knutson, J. W., The Nationwide Topical Fluoride Demonstration Program. *J.A.D.A.* 39:438 (Oct.) 1949.

263. Knutson, J. W., and Armstrong, W. D. The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. *Pub. Health Rep.* 58:1701 (Nov. 19) 1943.

264. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. *Pub. Health Rep.* 60:1085 (Sept. 14) 1945.

265. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. *Pub. Health Rep.* 61:1683 (Nov. 22) 1946.

266. Koehler, J. L., Oral Diagnosis in Relation to Blood Dyscrasias. *Houston Dist. D. S. J.* 8-12, 5-11, 1937-38.

267. Kronfeld, R., *Histopathology of the Teeth and Their Surrounding Structures*. Philadelphia: Lea & Febiger, 1933.

268. Kronfeld, R., The Epithelial Attachment and So-called Nasmyths Membrane. *J.A.D.A.* 17:1880 (Oct.) 1930.

269. Kostrubala, J. G., Potential Anatomical Spaces in the Face. *Am. J. Anat.* 68:28 (April) 1945.

270. Lacassagne, A., Hormonal Pathogenesis of Adenocarcinoma of the Breast. *Am. J. Cancer.* 27:217, 1936.

271. Lanman, T. H., and Ingalls, T. H., Vitamin C Deficiency and Wound Healing, Experimental and Clinical Study. *Ann. Surg.* 105:616, 1937.

272. Lazansky, J. P., et al., Factors Influencing the Incidence of Bacteremias Following Surgical Procedures in the Oral Cavity. *J. D. Res.* 28:533 (Dec.) 1949.

273. LeGro, A. L., Ceramics in Dentistry. *D. Items of Interest* 104, 178, 264, 340, 415, 511, 574, 672, 745, 827, 898, Jan.-Dec., 1924; 1, 81, 170, 251, 331, 505, 575, 669, 680, Jan.-Dec., 1925.

274. Letterer, E.; Neidhardt, K., and Klett, H., Cancer of Lung and Pneumoconiosis After Exposure to Chromium. *Bull. Hyg.* 22:733 (Dec.) 1947 (Abstract).

275. Leber, T., and Rottenstein, J. B., *Dental Caries and Its Causes*. Trans. by Thomas H. Chandler. Philadelphia: Lindsay and Blakiston, 1873.

276. Litch, W. F., *American System of Dentistry*. Philadelphia: Lea Bros. & Co., 1886.

277. Lufkin, A. W., *History of Dentistry*. Philadelphia: Lea & Febiger, 1948.

278. Lyle, A. G., Higher Education Recommended to Increase Interest in Dentistry. *J.A.D.A.* 35:397 (Sept.) 1947.

279. Lyons, C., Penicillin Therapy of Surgical Infections in the U. S. Army. *J.A.M.A.* 123:1007 (Dec.) 1943.

280. McCollum, E. V., and Simmonds, N., *Newer Knowledge of Nutrition, the Use of Foods for the Preservation of Vitality and Health*, ed. 4, New York: The Macmillan Co., 1929, chap. 27, pp. 433-468.

281. McConnell, G., Value of the Clinical Laboratory in the Practice of Dentistry (Diagnosis of Disease). *J. Nat. D. A.* 7:305 (March) 1920.

282. McCoy, J. D., Some Observations Concerning the Requirements of the Radiographer and Descriptive Terminology. *Internat. J. Orth.* 3:729 (Dec.) 1917.

283. McDowell, J. N., X-ray Diagnosing in Orthodontia. *D. Cosmos* 42:234 (May) 1900.

284. McKay, F. S., and Black G. V., A Brief Synopsis of a Paper Entitled Mottled Teeth: an Endemic Developmental Imperfection of the Enamel of the Teeth, Heretofore Unknown in the Literature of Dentistry. *Panama-Pacific Dent. Cong.* 1:95, 1915.

285. Maggs, W. A., Teeth of Microcephalics and Cretins. *Trans. Odont. Soc. Gr. Brit.* 34:1, 1901.

286. Maier, W. A.; Ray, H. G.; Stahl, S. S.; Wenz, F. M., and Orban, B., Symposium on Systemic Aspects of Periodontal Disease. *G. J. Period.* 19:123 (Oct.) 1948.

287. Maitland, H. S., and Humphries, R. E., Osteogenic Sarcoma in Dial Painters Using Luminous Paint. *Arch. Path.* 7:406, 1929.

288. Manley, E. B., Effect of Filling Materials on the Human Tooth Pulp. *Proc. Royal Soc. Med.* 34:693, 1941.

289. Manley, E. B., Pulp Reactions to Dental Cements. *D. Record* 44:75 (April) 1944.

290. Manley, E. B., Traumatic Effect of the Drill During Cavity Preparation. *Brit. D. J.* 70:329 (May 1) 1941.

291. Manly, R. S., Factors Influencing Tests on the Abrasion of Dentin by Brushing with Dentifrices. *J. D. Res.* 23:59 (Feb.) 1944.

292. Manly, R. S., and Brooks, E. J., Transparency and Light Scattering of Dental Hard Tissues. *J. D. Res.* 26:427 (Dec.) 1947.

293. Mann, A. W., Nutrition as it Affects the Teeth. *M. Clin. North America.* 27:545 (March) 1943.

294. Mann, A. W.; Spies, T. D., and Springer, M., The Oral Manifestations of Vitamin B Complex Deficiencies. *J. D. Res.* 20:269 (June) 1941.

295. Marble, A., Diabetes Mellitus, Its Relation to Oral Pathosis, a Symposium. *J. Periodont.* 18:151 (Oct.) 1947.

296. Markowitz, H. A., and Gerry, R. G., Temporomandibular Joint Disease (a Collective Review). *Oral Surg., Oral Med., & Oral Path.* 2:1309 (Oct.) 1949 & 3:74 (Jan.) 1950.

297. Marshall, J. S., *Operative Dentistry.* Philadelphia: J. B. Lippincott Co., 1901.

298. Massler, M., and Schour, I., Postnatal Growth Patterns of the Facial Skeleton as Measured by Vital Injections of Alizarine Red S. *J. D. Res.* 23:217 (June) 1944.

299. Mayo, C. H., Constitutional Diseases Secondary to Local Infections. *D. Rev.* 27:281 (April) 1913.

300. Medical-Dental Relations: Report of Joint Committee from Rhode Island Medical Society and Rhode Island State Dental Society. *J.A.D.A.* 36:482 (June) 1948.

301. Mellanby, H., The Effect of Maternal Dietary Deficiencies of Vitamin A on Dental Tissues in Rats. *J. D. Res.* 20:489 (Oct.) 1941.

302. Mellanby, M., Diet and the Teeth, an Experimental Study. Med. Res. Council, Spec. Rept. Series, No. 140, London, 1929.

303. Miller, B. F., Inhibition of Experimental Dental Caries in the Rat by Fluoride and Iodoacetic Acid. *Proc. Soc. Exp. Biol. and Med.* 38:589, 1938.

304. Miller, S. C., *Oral Diagnosis and Treatment Planning.* Philadelphia: Blakiston, 1936; ed. 2, 1946.

305. Miller, W. D., Some Studies on the Anatomy of Teeth and Their Practical Application. *Odont. Soc. Trans.* 37 (and Series):182, 1904-5.

306. Miller, W. D., The Human Mouth as a Focus of Infection. *D. Cosmos* 33:789 (Oct.), 33:913 (Nov.) 1891.

307. Miller, W. D., *The Micro-organisms of the Human Mouth.* Philadelphia: The S. S. White Dental Mfg. Co., 1890.

308. Miller, W., Discussion of Preiswerk's Paper, on the Etiology of Caries, at the 41st Meeting of the Dtsch. Zahnaerztl. Ges. *Dtsch. w. f-Zh.*, 20:492, 1902.

309. Miner, L. M. S., Value of Physical Studies in the Diagnosis and Treatment of Lesions of the Mouth. *J.A.D.A.* 22:1676 (Oct.) 1935.

310. Molt, F. F., Correct Radiographic Technic and Interpretation in Its Relation to the Elimination of Oral Pathologic Foci. *D. Cosmos* 65:341 (April) 1923.

311. Moorehead, F. B., and Dewey, K. W., *Pathology of the Mouth.* Philadelphia: W. B. Saunders Co., 1925.

312. Morton, W. J., The X-ray and Its Application in Dentistry. *D. Cosmos* 38:478 (June) 1896.

313. Muntz, J. A.; Dorfman, A., and Stephan, R. M., *In Vitro* Studies on Sterilization of Carious Dentin. I. Evaluation of Germicides. *J.A.D.A.* 30:1893 (Dec. 1) 1943.

314. Mummery, J. H., On the Process of Calcification in Enamel and Dentin. *British D. J.* 35:653, 1914.

315. Mummery, J. H., The Innervation of the Dentin. *D. Cosmos* 58:258 (March) 1916.

316. Myers, R. E., Variable Factors in the Technic of Dental Castings. *J.A.D.A.* 30:203 (Feb. 1) 1943.

317. Nelson, M. M.; Sulon, E.; Becks, H., and Evans, H. M., Chronic Riboflavin Deficiency in the Rat; Ossification in the Proximal Tibial Epiphysis. *Proc. Soc. Exper. Biol. & Med.* 66:631 (Dec.) 1947.

318. Nesbitt, N. B., A Simple Form of Removable Bridge Work With Cast Clasps. *D. Cosmos* 60:204 (March) 1918.

319. Nord, F. F., and Werkiman, C. H., *Advances in Enzymology and Related Subjects of Biochemistry*, vol. 3. New York: Interscience Publishers, 1943.

320. Noyes, F. B., The Structural Requirements for Strength in Enamel Walls and Margins. *Ontario Dental Soc. Trans.* p. 68-90, 1902.

321. Noyes, F. B., and Dewey, K. W., The Lymphatics of the Dental Region. *J.A.M.A.* 71:1179, 1918.

322. Okell, C. C., and Elliot, S. D., Bacteremia and Oral Sepsis, With Special Reference to Aetiology of Subacute Endocarditis. *Lancet* 2:869, 1935.

323. Oppenheim, A., Human Tissue Response to Orthodontic Intervention of Short and Long Duration. *Am. J. Orthodont. & Oral Surg.* 28:263 (May) 1942.

324. Orban, B., Periodontal Disturbances; Practical Management. *J.A.D.A.* 35:545 (Oct. 15) 1947.

325. Orban, B., and Kohler, J., Die physiologische Zahnfleischtasche, Epithelansatz und Epitheltiefenwucherung. *Ztschr. F. Stomatol.* 22:353, 1924.

326. Orban, B., Ritchey, B., and Zander, H. A., Experimental Study of Pulp Changes Produced in the Decompression Chamber. *J. D. Res.* 25:299 (Oct.) 1946.

327. O'Rourke, J. T., and Miner, L. M. S., *Dental Education in the United States.* Philadelphia: W. B Saunders Co., 1941.

328. Ottolengui, Rodriguez, Extraction and Delay Versus Expansion and Early Interference in the Treatment of Prognathism. *D. Cosmos* 41:1116 (Nov.) 1899.

329. Paffenbarger, G. C.; Swaney, A. C.; Schoonover, I. C., & Dickson, G., A.D.A. Specification No. 9 for Dental Silicate Cement: First Revision. *J.A.D.A.* 40:186 (Feb.) 1950.

330. Peeso, F. A., Removable Bridge Work and Removable Abutments Technique. *D. Cosmos* 47:1004 (Aug.) 1905.

331. Pell, G. J., Tooth Division Technic for Removal of the Impacted Mandibular Third Molar. *J. Missouri D. A.* 21:227 (Dec.) 1941.

332. Pendleton, E. C., The Minute Anatomy of the Lower Jaw in Relation to the Denture Problem. *J.A.D.A.* 29:719 (May) 1942.

333. Perky, H. D., Nutrition as a Tooth Builder. *D. Cosmos* 53:467 (May) 1911.

334. Peterson, S., Aptitude Tests for Dental Students. *J.A.D.A.* 35:868 (Dec. 15) 1947.

335. Peyton, F. A., Restorative Materials, Chapter XVII in *Dental Science and Dental Art*, edited by S. M. Gordon. Philadelphia: Lea and Febiger, 1938.

336. Philbrook, D., Cast Fillings. *Trans. Iowa State Dental Soc.*, pp. 277-278, 1896-1897.

337. Phillips, R. W., and Swarts, M. L., Mercury Analysis of One Hundred Amalgam Restorations. *J. D Res.* 28:569 (Dec.) 1949.

338. Pike, C., Suggestions Relating to the Examination of Teeth. *Am. J. D. Sc.* 3rd Ser. 35:203, 1904.

339. Pike, G. C., Surgical Preparation of Jaw Ridges. *Illinois D. J.* 9:283 (Aug.) 1940.

340. Pippin, B. N., Problems of Treatment Planning and Execution Met With in the General Practice of Dentistry. *Washington Univ. D. J.* 2:11 (Aug.) 1935-36.

341. Pollia, J. A.; Alvarez, W. C.; Platt, F. L.; Chipman, E. D.; Myer, K. F.; Burns, R., Jr., and Millberry, G. S., The Removal or Retention of Pulpless Teeth. *J. Nat. D. A.* 7:175 (Feb.) 1920.

342. Price, A. W., Phenomena of Cataphoresis. *D Cosmos* 39:702 (Sept.) 1897.

343. Price, W. A., *Dental Infections* vol. 1, Oral and Systemic; vol. II, Degenerative Diseases; Cleveland: Penton Publishing Co., 1923.

344. Price, W. A., *Nutrition and Physical Degeneration.* New York: Paul B. Hoeber, 1939.

345. Price, W. A., *Dental Infections and Degenerative Diseases*, vol. II. Cleveland: Penton Publishing Co., 1923.

346. Prime, J. M., Controlling Dental Caries. *J.A.D.A.* 24:1950 (Dec.) 1937.

347. Prinz, H., *Dental Chronology*, Part III:130. Philadelphia: Lea & Febiger, 1945.

348. *Proceedings of the National Cancer Conference. American Cancer Society*, N. Y., p. 175, 1949.

349. *Quarterly Cumulative Index Medicus*, Chicago: American Medical Association, 1947.

350. Rankow, R. M., The Systemic Intramuscular Use of Penicillin in Dental Infections. *Oral Surg., Oral Med., & Oral Path.* 2:630 (May) 1949.

351. Raper, H. R., Uses and Advantages of the X-ray as an Aid to Dental Diagnosis, Including the Differentiation of the Radiographic Appearance of Normal and Abnormal Tissues. *D. Cosmos* 57:510 (May) 1915.

352. Raper, H. R., Teaching of Dental Radiography. *D. Brief* 18:602 (Sept.) 1913.

353. Rault, C. V., Fibrin Foam as a Clinical Aid in Dental Surgery. *J.A.D.A.* 33:1419 (Nov. 1) 1946.

354. Ray, H., Gingival Structures in Diabetes Mellitus. *J. Periodont.*, 1950 (in press).

355. Ray, K. W., Behavior of Silicious Cements. *J.A.D.A.* 21:237 (Feb.) 1934.

356. Reinhard, E. H., Artificially Prepared Radioactive Isotopes as a Means of Administering Radiation Therapy. *Am. J. Roentgenol. and Radium Therapy* 58:737 (Dec.) 1947.

357. Reimann, H. A., and Havens, W. P., Focal Infection and Systemic Disease; Critical Appraisal; Case Against Indiscriminate Removal of Teeth and Tonsils. *J.A.M.A.* 114:1 (Jan. 6) 1940.

358. Restarski, J. S., Effect of Vibration Upon the Dental Pulp and Periosteum of White Rats. *J. D. Res.* 24:57 (April) 1945.

359. Rhoads, C. P., Nitrogen Mustards in the Treatment of Neoplastic Disease. *J.A.M.A.* 131:656 (June 22) 1946.

360. Rhoads, C. P., Recent Advances in Treatment of Cancer. *J.A.M.A.* 136:305 (Jan. 31) 1948.

361. Richards, A. G., and Thomassen, L., Microstructure of Tooth Surfaces as Revealed by the Electron Microscope. *J.A.D.A.* 31:772 (June 1) 1944.

362. Rivers, T. M., and Pearce, L., Growth and Persistence of Filterable Viruses in a Transplantable Rabbit Neoplasm. *J. Exp. Med.* 42:523 (Oct.) 1925.

363. Robinson, H. B. G., Classification of Cysts of Jaws. *A. J. Orth. & Oral Surg.* (Oral Surg. Sect.) 31: 370 (June) 1945.

364. Robinson, H. B. G., The Metabolism of Minerals and Vitamins and the Effects of Systemic Conditions on Dental Caries. *J.A.D.A.* 39:51 (July) 1949.

365. Robinson, H. B. G., Metastasis of Chondromyxosarcoma to Jaw and Tooth. *Am. J. Orth. & Oral Surgery* (Oral Surg. Sect.) 33:509 (July) 1947.

366. Robinson, H. B. G., Pathology and Classification of Periodontal Diseases. *North-West Den.* 29:47 (Jan.) 1950.

367. Robinson, H. B. G., Toothbrushing Habits of 405 Persons. *J.A.D.A.* 33:1113 (Sept. 1) 1946.

368. Rodriguez, F. E., Studies in the Specific Bacteriology of Dental Caries. *Military D. J.* 5:199 (Dec.) 1922.

369. Rosebury, T., Dental Caries. *N. Y. Acad. Dent.* 2:154 (Sept.) 1935.

370. Rosebury, T., The Etiology of Vincent's Infection, Chapter 13 in *Dental Science and Dental Art*, edited by S. M. Gordon. Philadelphia: Lea & Febiger, 1938.

371. Rosebury, T.; Epps, L. J., and Clark, A. R., Study of Isolation, Cultivation and Pathogenicity of Actinomyces Israeli Recovered from Human Mouth and From Actinomycosis in Man. *J. Infect. Dis.* 74: 131 (Mar.-Apr.) 1944.

372. Rosenau, M., *Preventive Medicine and Hygiene*. Boston: Appleton-Century Co., 1940.

373. Rosenow, E. C., Mouth Infection as a Source of Systemic Disease. *J.A.M.A.* 63:2006, 1914; 65: 1687, 1915.

374. Round, H.; Kirkpatrick, H. J. R., and Hails, C. G., Further Investigations on Bacteriologic Infections of Mouth. *Proc. Roy. Soc. Med.* 29:1550, 1936.

375. Rounds, F. W., The Influence of George B. Winter on the Development of Exodontia. *Am. J. Orth. & Oral Surg.* (Orthodontics Sect.) 26:985 (March) 1940.

376. Rous, P., A Sarcoma of the Fowl Transmissible by an Agent Separable From the Tumor Cells. *J. Exper. M.*, Lancaster, Pa. and N. Y., 1911.

377. Rush, B., quoted by Prinz, H., *Dental Chronology*. Philadelphia: Lea & Febiger, 1945.

378. Satterlee, F. L., Recent Applications of the Tri-ultra-violet or X-ray to Dental Surgery. *D. Cosmos* 46:639 (Aug.) 1904.

379. Souder, W., and Paffenbarger, G. C., *Physical Properties of Dental Materials*. Nat. Bur. of Standards Cir. C 433, Washington, 1942.

380. Schamberg, M. I., Diagnostic Value of X-rays in Dentistry and Oral Surgery. *D. Brief.* 9:549 (Sept. 1) 1904.

381. Schamp, J. R., and Schamp, H. M., Variability of the Pain Threshold in Man. *J. D. Res.* 25:101 (April) 1946.

382. Scheele, L. A., A Forward Look at Dentistry. *J.A.D.A.* 37:627 (Dec.) 1948.

383. Scheu, C. H., A New Precision Casting Technic. *J.A.D.A.* 19:630 (April) 1932.

384. Scheu, C. H., Controlled Hydroscopic Expansion of Investment to Compensate for Shrinkage of Inlay Castings. *J.A.D.A.* 22:452 (March) 1935.

385. Schlosser, R. O., Basic Factors Retarding Resorptive Changes of Residual Ridges Under Complete Denture Prosthesis. *J.A.D.A.* 40:12 (Jan.) 1950.

386. Schneider, A. E., The Preparation of a Tooth for a Porcelain Veneer Crown. *Review* 31:378, 1917.

387. Schoonover, I. C.; Souder, W., and Beall, J. R., Excessive Expansion of Dental Amalgam. *J.A.D.A.* 29: 1825 (Oct. 1) 1942.

388. Schour, I., and Massler, M., Effect of the Endocrines on the Teeth, Jaws and Facial Skeleton. *Proc. Dent. Cent.* p. 145, 1940.

389. Schour, I., and Massler, M., Endocrines and Dentistry. *J.A.D.A.* 30:595 (April 1) 1943.

390. Schour, I., and Massler, M., Prevalence of Gingivitis in Young Adults. *J. D. Res.* 27:733 (Dec.) 1948.

391. Schour, I., and Massler, M., The Effects of Dietary Deficiencies Upon the Oral Structures. *J.A.D.A.* 32:714 (June 1); 871 (July 1); 1022 (Aug. 1), and 1139 (Sept. 1) 1945.

392. Schour, I., and Massler, M., The Growth Pattern of Human Teeth, Part I, *J.A.D.A.* 27:1778 (Nov.) 1940; Part II, *J.A.D.A.* 27:1918 (Dec.) 1940.

393. Schultz, L. W., Therapeutic Management of the Hysterical Patient. *J.A.D.A.* 34:828 (June 15) 1947.

394. Scott, D. B., and Wyckoff, R. W. G., Shadowed Replicas of Ground Sections Through Teeth. *Pub. Health Rep.* 62:422 (March 21) 1947.

395. Scudder, C. L., *Tumors of the Jaws*. Philadelphia: W. B. Saunders Co., 1912.

396. Sears, V. H., Balanced Occlusion. *J.A.D.A.* 12:1448 (Dec.) 1925.

397. Sears, V. H., *Principles and Technics for Complete Denture Construction*. St. Louis: C. V. Mosby Co., 1949.

398. Seidlin, S. M.; Marinelli, L. D., and Oshry, E., Radioactive Iodine Therapy: Effect on Functioning Metastasis of Adenocarcinoma of the Thyroid. *J.A.M.A.* 132:838 (Dec. 7) 1946.

399. Selbie, F. R.; Simon, R. D., and Robinson, R. M. H., Serological Classification of Viridans Streptococci From Subacute Bacterial Endocarditis, Teeth, and Throats. *Brit. M. J.* No. 4629:667 (Sept. 24) 1949.

400. Shell, J., Cast Gold Alloys: Their Physical Properties and Dental Application. *J.A.D.A.* 18:904 (May) 1931.

401. Sherrington, C. S., *The Integrative Action of the Nervous System*. New Haven, Conn.: Yale University Press, 1906.

402. Shope, R. E., and Hurst, E. W., Infectious Papillomatosis of Rabbits, With Note on Histopathology. *J. Exp. Med.* 58:607 (Nov.) 1933.

403. Shroff, F. R., An Histological Study With Special Reference to Synthetic Porcelain. *New Zealand D. J.* 42:99 (July); 145 (Oct.) 1946; 43:35 (Jan.) 1947.

404. Sicher, H., Temporomandibular Articulation in Mandibular Overclosure. *J.A.D.A.* 36:131 (Feb.) 1948.

405. Simpson, C. O., *The Technic of Oral Radiography*. St. Louis: C. V. Mosby Co., 1906.

406. Skinner, E. W.; Cooper, E. N., and Beck, F. E., Reversible and Irreversible Hydrocolloid Impression Materials. *J.A.D.A.* 40:196 (Feb.) 1950.

407. Skinner, E. W., *The Science of Dental Materials*, ed. 3. Philadelphia: W. B. Saunders Co., 1946.

408. Skinner, E. W., and Pomes, C. E., Dimensional Stability of Alginate Impression Materials. *J.A.D.A.* 33:1253 (Oct. 1) 1946.

409. Slye, M., Relation of Heredity to Cancer, With Regard to Communication of President C. C. Little of University of Michigan. *J. Cancer Res.* 12:89 (June) 1928.

410. Smith, A. E., Penicillin Progress. *J.A.D.A.* 31:1379 (Oct. 1) 1944.

411. Smith, D. T., *Oral Spirochetes and Related Organisms in Fuso-spirochetal Disease*. Baltimore: Williams and Wilkins, 1932.

412. Snyder, M. L., Simple Colorimetric Method for Diagnosis of Caries Activity. *J.A.D.A.* 28:44 (Jan.) 1941.

413. Sognnaes, R. F., Caries-Conducive Effect of a Purified Diet When Fed to Rodents During Tooth Development. *J.A.D.A.* 37:676 (Dec.) 1948.

414. Souder, W., Fifteen Years of Research at the National Bureau of Standards. *J.A.D.A.* 21:58 (Jan.) 1934.

415. Souder, W., Physical Properties of Dental Materials. *J.A.D.A.* 12:509 (May) 1925.

416. The Specialties in Dentistry: Present Status and Recommendations for the Future. *J.A.D.A.* 34: 527 (April 15) 1947.

417. Spencer, P. G., *Prevention of Malocclusion*. St. Louis: C. V. Mosby Co., 1941.

418. Spies, T. D., Treatment of Pellagra. *J.A.M.A.* 104:1377 (April 20) 1935.

419, 420. *Statistical Abstract of the United States*, ed. 67. Bureau of the Census, Washington, D. C., p. 79, 1946.

421. Stauffer, S. M., The Dentist—Guardian of the Gateway to Nutrition. *Dental Summary* 32:96 (Feb.) 1912.

422. Stephan, R. M., Intra-oral Hydrogen-ion Concentrations Associated With Dental Caries Activity. *J. D. Res.* 23:257 (Aug.) 1944.

423. Stowe, L. R., cited by Holt, L. E., and Howland, J., *Diseases of Infancy and Childhood*. New York: D. Appleton-Century Company, Inc., 1940.

424. Straith, C. L., Management of Facial Injuries Caused by Motor Accidents. *J.A.M.A.* 108:101 (Jan. 9) 1937.

425. Sweeney, J. T., Delayed Expansion in Non-zinc Alloys. *J.A.D.A.* 28:2018 (Dec.) 1941.

426. Swenson, M. G., *Complete Dentures*, ed. 2. St. Louis: C. V. Mosby Co., 1947.

427. Taggart, W. H., A New and Accurate Method of Making Gold Inlays. *D. Cosmos* 49:1117 (Nov.) 1907.

428. Talbot, E. S., Pyorrhea Alveolaris in Mercurial and Lead Poisoning and Scurvy. *D. Cosmos* 39:805 (Oct.) 1897.

429. Taran, L. M., Dental Care of Children with Heart Disease. *J. 2nd Dist. D. Soc. (N. Y.)* 28:93 (Dec.) 1942.

430. Taylor, N. O., Standards for Dental Materials. *Iowa D. Bul.* 17:89 (Aug.) 1931, and *Mich. State D. Soc. Bul.* 13:26 (July) 1931.

431. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T., Inlay Casting Golds: Physical Properties and Specifications. *J.A.D.A.* 19:36 (Jan.) 1932.

432. Thoma, K. H., A Historical Review of Methods Advocated for the Treatment of Jaw Fractures, With Ten Commandments for Modern Fracture Treatment. *A. J. Orth. & Oral Surg.* (*Oral Surg. Sect.*) 30:399 (Aug.) 1944.

433. Thoma, K. H., A Method of Space Obliteration After Odontectomy. *Am. J. Orth. & Oral Surg.* (*Oral Surg. Sect.*) 31:198 (April) 1945.

434. Thoma, K. H., *Clinical Pathology of the Jaws*. Springfield, Ill.: C. C. Thomas, 1934.

435. Thoma, K. H., Correction of Deformities of the Jaws. *Guy's Hospital Gazette* 62:343, 1949.

436. Thoma, K. H., Genioplasty with Tantalum Gauze. *Oral Surg., Oral Med., & Oral Path.* 2:63 (Jan.) 1949.

437. Thoma, K. H., Odontogenic and Osteogenic Tumors of the Jaws. *Annals of the Royal Coll. of Surgeons of England* 3:73, 1949.

438. Thoma, K. H., Odontogenic Infections of the Jaws: Their Treatment With Antibiotics. *J.O.S.* 6:16 (Jan.) 1948.

439. Thoma, K. H., *Oral Diagnosis and Treatment Planning*, ed. 1, 2, 3. Philadelphia: W. B. Saunders, 1936, 1943, 1949.

440. Thoma, K. H., *Oral Pathology*. St. Louis: C. V. Mosby Co., 1941.

441. Thoma, K. H., *Oral Pathology*, ed. 2. St. Louis: C. V. Mosby Co., 1944.

442. Thoma, K. H., *Oral Roentgenology*. Boston: Ritter Co., 1917; ed. 2, Philadelphia: Lea & Febiger, 1922.

443. Thoma, K. H., *Oral Surgery*. St. Louis: C. V. Mosby Co., 1948.

444. Thoma, K. H., The Management of the Malposed Inferior Third Molar. *J. D. Res.* 12:175 (Feb.) 1932.

445. Thoma, K. H., Tumors of the Mouth and Jaws; Collective Review. *Internat. Abstr. Surg.* 67:322, 1938.

446. Thomas, B. O. A., Effectiveness of Chilled Burs in Eliminating Pain. *J. D. Res.* 20:361 (Aug.) 1941.

447. Thomas, B. O. A., Penetration of Phenol in Tooth Structure. *J. D. Res.* 20:435 (Oct.) 1941.

448. Thomas, B. O. A., The Child Patient as a Future Periodontal Problem. *J.A.D.A.* 35:763 (Dec. 1) 1947.

449. Thomas, B. O. A., The Relationship of Operative Procedures to the Health of the Periodontal Tissues. *J.A.D.A.* 39:502 (Nov.) 1949.

450. Thompson, J. R., and Craddock, F. W., Functional Analysis of Occlusion. *J.A.D.A.* 39:404 (Oct.) 1949.

451. Tims, H. W. Marett, On the Significance of Certain Epithelial Bodies in Connection With Developing Teeth. *Brit. J. D. Sc.* 47:612, 1904.

452. Todd, T. W., Hereditary and Environmental Factors in Facial Development. *Internat. J. Orthodontia* 18:799 (Aug.) 1932.

453. Toussy, S., X-ray Measurement of the Permanent Teeth Before Eruption to Provide for the Early Regulations of the Dental Arch. *J. Allied D. Soc.* 7:185 (June) 1912.

454. Toverud, G., Influence of Diet on Teeth and Bones. *J. Biol. Chem.* 58:583 (Dec.) 1923.

455. Tunnicliff, R.; Fink, E. B., and Hammond, C., Significance of Fusiform Bacilli and Spirilla in Gingival Tissue. *J.A.D.A.* 23:1939 (Oct.) 1936.

456. Ulrich, P., Testosterone et son Role Possible dans le Traitement de Cancer du sein. *Acta, Union Internat. Contre Cancer* 4:377, 1939.

457. Van Horn, C. S., Casting: A Review and Commentary, Including a Technique. *D. Cosmos* 52:873 (Aug.) 1910.

458. Van Huysen, G.; Bale, W. F., and Hodge, H. C., Comparative Studies of the Roentgen-ray Absorption Properties of Normal and Pathological Dentin by Densitometric and Ionization Methods. *D. Cosmos* 77:146 (Jan.) 1935.

459. Van Huysen, G.; Bishop, F. W., and Warren, S. L., Quantitative Roentgen-ray Study of Certain Pathological Changes in the Dentin. *D. Cosmos* 75: 729 (Aug.) 1933.

460. Volker, J. F., Effect of Fluorine on Solubility of Enamel and Dentin. *Proc. Soc. Exper. Biol. and Med.* 42:725 (Dec.) 1939.

461. Volker, J. F., Studies on the Acid Solubility of Human Enamel. *J. D. Res.* 19:35 (Feb.) 1940.

462. Von Beust, T., Are the Capillaries of Enamel Capable of Sustaining Metabolism? *D. Register* 68:180 (April 15) 1914.

463. Von Beust, T., The Metabolism of Enamel in Relation to the Resistance to Caries. *D. Register* 66: 496, 1912.

464. Wainwright, W. W., and Nelson, M. M., Changes in the Oral Mucosa Accompanying Acute Pantothenic Acid Deficiency in Young Rats. *Am. J. Orthodont. & Oral Surg.* (*Sect. Oral Surg.*) 31:406 (July) 1945.

465. Waldron, C. W.; Karanjian, V. H., and Parker, D. B., Skeletal Fixation in the Treatment of Fractures of the Mandible. *J.O.S.* 1:59 (Jan.) 1943.

466. Waldron, C. W.; Peterson, R. G., and Waldron, C. A., Surgical Treatment of Mandibular Prognathism. *J.O.S.* 4:61 (Jan.) 1946.

467. Walkhoff, O., The Structure of Enamel and Its Significance in Caries. *D. Record* 33:660, 1913.

468. Ward, M. C., and Scott, E. O., Effect of Variations in Manipulation on Dimensional Changes, Crushing Strength, and Flow of Amalgams. *J.A.D.A.* 19:1683 (Oct.) 1932.

469. Ward, M. L., *American Textbook of Operative Dentistry*, ed. 3. Philadelphia: Lea & Febiger, 1920.

470. Warkany, J., and Nelson, R. C., Skeletal Abnormalities Induced in Rats by Maternal Nutritional Deficiency; Histologic Studies. *Arch. Path.* 34:375 (Aug.) 1942.

471. Warren, S. L.; Bishop, F. W.; Hodge, H. C., and Van Huysen, G., A Quantitative Method for Studying the Roentgen-ray Absorption of Tooth Slabs. *Am. J. Roentgenol.* 31:663 (May) 1934.

472. Wedelstaedt, E. K., A System of Measurement of Teeth, and Some Ideal Cavities. *D. Cosmos* 39:375 (May) 1897.

473. Weiner, L., Use of Penicillin in Clinical Dentistry. *J.A.D.A.* 32:538 (May) 1945.

474. Weinmann, J. P.; Wessinger, G. D., and Reed, G., Correlation of Chemical and Histological Investigations on Developing Enamel. *J. D. Res.* 21:171 (April) 1942.

475. Williams, J. L., A Contribution to the Bacteriology of the Human Mouth. *D. Cosmos* 41:317 (April) 1899.

476. Williams, J. L., A Contribution to the Study of Pathology of Enamel. *D. Cosmos* 39:353 (May) 1897.

477. Williams, N. B., and Harrison, R. W., Sensitization of Rabbits by Intradermal Injection of Heat-killed Lactobacilli of Human Oral Origin. *J. D. Res.* 21:223 (April) 1942.

478. Williams, R. R., and Cline, J. K., Synthesis of B_1. *J. Am. Chem. Soc.* 58:1504 (Aug.) 1936.

479. Wilson, G. H., *A Manual of Dental Prosthetics*. Philadelphia: Lea & Febiger, 1920.

480. Winter, G. B., *Impacted Mandibular Third Molar*. St. Louis: Am. Med. Book Co., 1926.

481. Wolbach, S. B., and Howe, P. R., The Incisor Teeth of Albino Rats and Guinea Pigs in Vitamin A Deficiency and Repair. *Am. J. Path.* 9:275 (May) 1933.

482. Wolbach, S. B., and Howe, P. R., Tissue Changes Following Deprivation of Fat-soluble A Vitamin. *J. Exper. Med.* 42:753 (Dec.) 1925.

483. Wolbach, S. B., and Howe, P. R., Vitamin A Deficiency in the Guinea Pig. *Arch. Path. & Lab. Med.* 5:239 (Feb.) 1928.

484. Wolfer, J. A.; Farmer, C. J.; Carroll, W. W.; Walter, W., and Manshardt, D. O., An Experimental Study in Wound Healing in Vitamin C Depleted Human Subjects. *Surg., Gynec. & Obst.* 84:1 (Jan.) 1947.

485. Woodbury, C. E., Some of the Concrete Essentials of Operative Dentistry. *Illinois D. J.* 7:5 (Jan.) 1938.

486. Wright, R. W., Diagnosis and Treatment Planning in Relation to Mouth, Teeth and Jaws. *D. J. Australia* 16:227 (July) 1944.

487. Wright, W. H., Dental Prosthetic Service. I. Shall Dentistry Maintain Its Present Unity? *J. Am. Coll. Dentists* 4:110 (Oct.) 1937.

488. Yamagiwa, K., and Ichikawa, K., Experimentelle Studie uber die Pathogenese der Epithelialgeschwulste, *Mitt. a. d. med. Fakult. d. k. Univ. zu Tokyo*, 15:295-344, 1915-16.

489. Yamagiwa, K., and Ichikawa, K., Experimentelle Studie uber die Pathogenese der Epithelialgeschwulste. *Mitt. a. d. med. Fakult. d. k. Univ. zu Tokyo*, 1917-18.

490. Zabotinsky, A., *Technic of Conservative Dentistry, Preparation of Cavities*. Buenos Aires: Libreria Y Editorial "El Ateneo," 1938.

491. Zander, H. A., Penetration of Silver Nitrate Into Dentin II. *J. D. Res.* 24:121 (June-Aug.) 1945.

492. Zander, H. A., Reaction of the Pulp to Calcium Hydroxide. *J. D. Res.* 18:373 (Aug.) 1939.

493. Zander, H. A., The Efficacy of Cavity Varnishes in Preventing Pulp Irritation from Silicate Cements. *J. D. Res.* 25:186 (June) 1946.

494. Ziskin, D. E., Hormonal Therapy for Some Gingival Conditions. *J. D. Res.* 18:329 (Aug.) 1939.

495. Ziskin, D. E., The Effect of Certain Hormones on Gingival and Oral Mucous Membranes. *J.A.D.A.* 25:422 (March) 1938.

496. Ziskin, D. E.; Blackberg, S. N., and Slanetz, C. A., Effects of Subcutaneous Injections of Esterogenic and Gonadotrophic Hormones on Gums and Oral Mucous Membranes. *J. D. Res.* 15:407 (Dec.) 1936.

497. Ziskin, D. E., and Burket, L. W., Teaching Oral Diagnosis to Dental Students. *J. D. Educ.* 10:61, 1945.

498. Ziskin, D. E., and Nesse, G. J., Pregnancy Gingivitis: History, Classification, Etiology. *Am. J. Orthodont. & Oral Surg.* (*Sect. Oral Surg.*) 32:390 (June) 1946.

499. Ziskin, D. E.; Zegarelli, E. V., and Slanetz, C., Estrogen Implants in Dogs. *Am. J. Orthodont. & Oral Surg.* (*Sect. Oral Surg.*) 33:723 (Oct.) 1947.

500. Zander, H. A., Effect of a Penicillin Dentifrice on Caries Incidence in School Children. *J.A.D.A.* 40: 569 (May) 1950.

Advances in

DENTAL EDUCATION AND LICENSURE

Harlan H. Horner, Pd.D., LL.D.
Albany, N. Y.
Editor

1900 ★ 1950

DENTAL education and licensure have made unprecedented progress in the United States during the first half of the twentieth century. This introductory statement must necessarily deal briefly with such guideposts and landmarks as students, teachers, buildings and equipment, curriculum, university affiliation, advanced instruction, licensure and the principal agencies which have contributed to the progress that has been made. It is quite impossible in the space available in this special issue of THE JOURNAL for the authors of the several articles to present in full all of the many important developments and influences that have contributed to the advances made in dental education since the turn of the century. However, the broad outlines have been sketched faithfully. The authors have been chosen because of their intimate acquaintance with the fields about which they write. The editor records his deep appreciation of their prompt and willing responses to his requests.

FIFTY YEARS OF PROGRESS

Students

Fifty years ago the academic requirement for admission to a dental school, subject to no centralized supervision or control, was the completion of one year of high school work or the equivalent. "Or the equivalent" meant, in practice, that the candidates without the one year of high school training would be admitted anyway. The minimum requirement in 1950, enforced by common consent and by the supervision of the Council on Dental Education, is two years of credit in an approved liberal arts college. In the last year of record 11,336 students were enrolled in the accredited dental schools of the United States. Four thousand nine hundred and seventeen, or about 44 per cent, offered two years of college credit for admission; 2,737, or about 24 per cent, offered three years; 603, or about 5 per cent, offered four years without a degree; and 3,079, or about 27 per cent, offered a bachelor's or other degree. Thus more than half of all the students on their own motion offered more than the minimum requirement.

Teachers

Fifty years ago, when the dean of a dental school wanted an additional teacher, he went downtown, tapped a practicing dentist on the shoulder and said, "Come up to the school twice a week for two-hour sessions and be our professor of clinical dentistry." Today 54 per cent of the teaching load in all dental schools is carried by full-time teachers, 17 per cent by half-time teachers, and 29 per cent by less than half-time teachers. The part-time dental teacher fills an important place in the dental schools and will continue to do so; but the trend in the great majority of key positions is toward the trained teacher giving his full time and energy to teaching and research. The number of dental teachers with a bachelor's degree and with advanced professional training has doubled, trebled and quadrupled in the last 50 years.

Buildings and Equipment

Fifty years ago the great majority of the 57 dental schools then in operation were poorly housed and inadequately equipped for teaching and almost wholly without facilities for research. Today 25 of the 41 dental schools in operation in the United States are housed in buildings of modern design with equipment for teaching and facilities for research. Six of these buildings, all splendidly designed and equipped, have been erected recently and are now either occupied or will be occupied within the year. Seven were erected in the thirties and the remainder mainly in the twenties. Sixteen of the 41 schools in operation are still housed in quarters not wholly satisfactory, but are equipped for teaching and research perhaps better than any school was 50 years ago. Eight of these 16 schools have plans well advanced for new buildings. A new school, which will receive its first class in September 1950, already has the funds in hand for a new building.

Curriculum

Fifty years ago the National Association of Dental Faculties was debating the question of the establishment of a three-year course in dentistry and looking forward to a four-year course. Uniformity did not prevail and so-called "1-4," (one year predental, four years dental) "2-3," and "2-4" courses were conducted. It was not until 1937, upon the recommendation of the Curriculum Survey Committee, that the 2-4 plan was universally adopted. Thus the present curriculum is

clearly the product of the twentieth century. Perhaps a greater change has come about in objectives than in course content. In the teaching program prevention begins to rank with restoration.

University Affiliation

Fifty years ago there were 57 dental schools in operation in the United States. Twenty-three of that number, mainly detached and proprietary schools, have disappeared entirely. Thirty-four of the 41 schools in operation in 1950, or their immediate predecessors from which they developed, were in operation in 1900, of which 16 were then university schools and 18 were proprietary schools. Seven other schools now in operation were established after 1900, four beginning as university and independent institutions and three as proprietary.

There has not been a proprietary dental school in the United States since 1929. Of the 41 schools now in operation, 38 are *bona fide* integral units of universities, of which 14 are in state universities and 24 in privately incorporated universities. At least four schools in this latter number get some public support. The three remaining detached schools are nonproprietary; one is state supported and the other two are privately endowed. All three conduct their work on the basis of a university discipline.

Advanced Instruction

Fifty years ago postgraduate and graduate instruction in dentistry was scarcely known. The demands of the profession still far exceed the available opportunities for advanced instruction. Only one dental school offered advanced degrees prior to 1900. A recent study[1] showed that 15 schools had conferred 650 advanced degrees and certificates, largely since 1923. This record takes no account of the hundreds of postgraduate and refresher courses which have been offered.

Licensure

Fifty years ago not all states and territories had yet provided by law for the licensing of dentists and the regulation of dental practice. It was not until 1907 that the movement which began in 1841 reached to all the states.

Principal Agencies

The organizations and agencies which have contributed most to the progress of dental education and licensure in the last 50 years may be listed as follows in chronological order:

The National Association of Dental Examiners.—Established in 1883, this association, which changed its name to the American Association of Dental Examiners in 1944, has done more than any other agency to fix high standards for the licensing of dentists and to promote sound legislation for the regulation of practice.

The Dental Educational Council of America.—This council was established in 1909 and discontinued in 1936. It developed the four-year curriculum in detail, established the first list of classified dental schools and eliminated the proprietary dental schools.

The International Association for Dental Research.—This association was established in 1920, through the inspiration and leadership of Dr. William J. Gies, with the avowed purpose of promoting research—nothing else. In its annual meetings and in its *Journal of Dental Research*, the Association lives up to its high purpose.

Carnegie Foundation for the Advancement of Teaching.—A comprehensive study of dental education in America was published in 1926 as Bulletin No. 19 by the Carnegie Foundation for the Advancement of Teaching.[2] This study, sponsored

Example of improvement in dental school buildings. Left: Home of the Indiana Dental College 1894-1913. Right: Present home of Indiana University School of Dentistry, erected 1933

and financed by the Foundation, was conducted by Dr. William J. Gies, a distinguished biological chemist, who was then a member of the faculty of Columbia University. Dr. Gies spent five years in his studies and investigations. His scholarly and impartial approach to all problems, his limitless energy, his patience, his zeal and his high devotion to a cause commanded the confidence and cooperation of all agencies of dental education and of the dental profession. Bulletin No. 19, a volume of 692 pages, will always stand as an accurate and dependable source book in the history and evolution of dental education in America. It helped to spell the final doom of the proprietary dental school, set dental education on the way to its ultimate complete absorption by the universities, and awakened the public to the significance of dental care as a health measure. It also emphasized the fundamental obligation of society to give dental education and research adequate financial support.

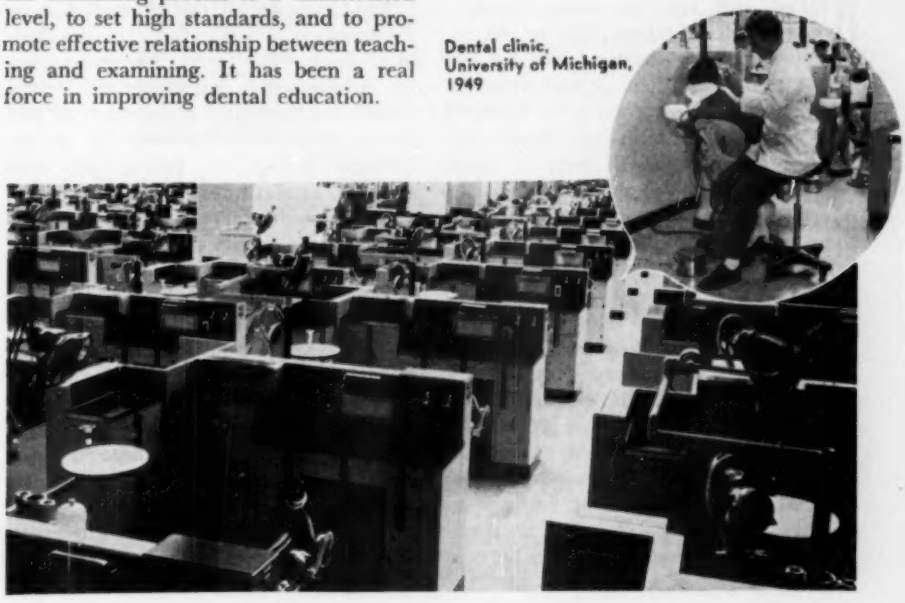
The American Association of Dental Schools.—This association was organized in 1923 as a result of the amalgamation of the American Institute of Dental Teachers, the National Association of Dental Faculties, the Dental Faculties Association of American Universities, and the Canadian Dental Faculties Associa-

Dental clinic, College of Physicians and Surgeons, about 1900

tion. The Association conducted a notable survey of dental teaching through a Curriculum Survey Committee and issued in 1935 *A Course of Study in Dentistry*[3] which led to the universal establishment of the 2-4 program and largely influenced the courses of study in all the schools. The Association established the *Journal of Dental Education* in 1935 and issued in 1945 an extended study on *Teaching in Colleges and Universities, with Special References to Dentistry*.[4] In this latter volume and in the curriculum survey report the Association was fortunate in the services of Dr. Lloyd E. Blauch, whose experience, general education, and facility of expression were invaluable.

The National Board of Dental Examiners.—This board was established as a standing committee in 1928 by the American Dental Association and is now recognized under constitutional amendment (Chap. IX, Sec. 10) as one of the councils of the Association. The Board serves to elevate the examining process to a disinterested level, to set high standards, and to promote effective relationship between teaching and examining. It has been a real force in improving dental education.

The Council on Dental Education.—The present Council was established as a standing committee in 1938 by the American Dental Association and is now recognized under constitutional amendment (Chap. IX, Sec. 10) as one of the councils of the Association. During the last 12 years the Council has conducted an exhaustive study of the dental schools and established an approved list of schools; issued an annual *Dental Students' Register* giving statistical data concerning enrolment in all the schools; issued and kept available in revised form a brochure on *Dentistry as a Professional Career* for the use of parents, students and guidance officers; organized and promoted an annual Congress on Dental Education and Licensure; established and put into operation standards for the approval of dental specialty boards; established standards for the approval of hospital dental internships, and of schools for the training of dental hygienists and dental laboratory technicians; defined graduate, post-



Dental clinic, University of Michigan, 1949

graduate and refresher courses and issued from time to time detailed accounts of such courses offered in the dental schools; promoted the absorption of privately endowed and detached schools by universities; counseled with state agencies about the establishment of new schools; and established a far-reaching mental and manual aptitude testing program for the aid of dental schools in the selection of students.

The American Dental Association.—The parent association is mentioned last but in many ways has made the largest contribution during the last 50 years to the advancement of dental education and licensure. This fine service has been rendered by sympathetic and helpful cooperation with all of the other organizations and agencies above-mentioned and by the direct sponsorship and support of the National Board of Dental Examiners and the Council on Dental Education. The Association furnishes abundant proof that a profession largely determines its own destiny. Dental education and licensure are fortunate and safe under the guardianship of the American Dental Association.

1. Horner, H. H., *Dental Education Today*, Chicago: University of Chicago Press, 1947.

2. Gies, Wm. J., *Dental Education in the United States and Canada*, New York: The Carnegie Foundation for the Advancement of Teaching, 1926.

3. *A Course of Study in Dentistry.* (Report of the Curriculum Survey Committee of the American Association of Dental Schools.) *D. Cosmos* 77:709 (July) 1935.

4. Blauch, L. E., *Teaching in Colleges and Universities; With Special Reference to Dentistry*, Indianapolis: American Association of Dental Schools, 1945.

ADMISSION TO DENTAL STUDY

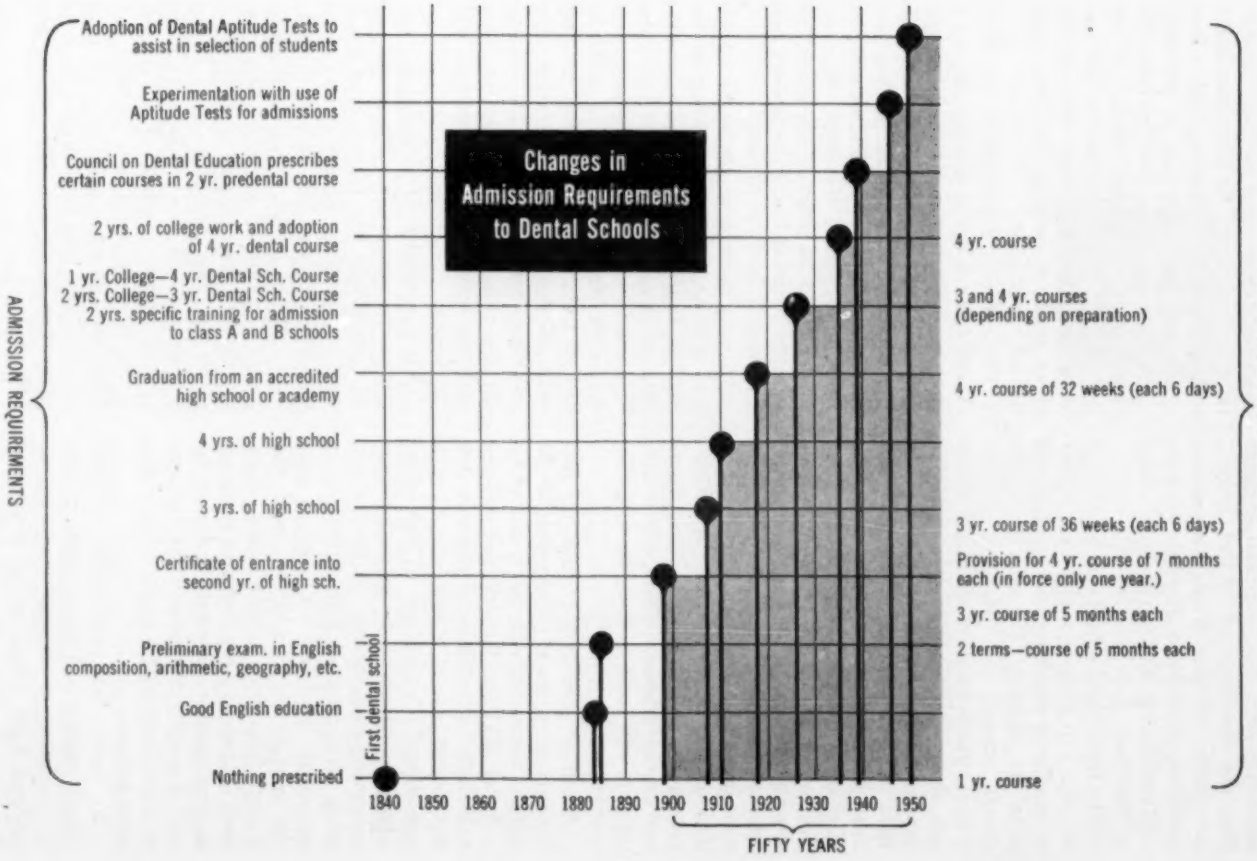
Shailer Peterson, Ph.D., Chicago

During the last 50 years, marked changes have taken place in the requirements or prerequisities for entrance to dental schools as well as in the number of students who have signified their interest in entering the dental profession. Associated with both of these changes have been changes in the methods of selecting beginning freshmen from those who have applied for admission.

All of the dental schools today require that an entering student must have completed successfully two years of college or university work including certain courses. A few of the schools accept only students who have completed three years of predental college work and some give preference to those who have already earned college degrees. Most of the schools have also decided upon a minimum grade-point average which they will expect an applicant to have earned if he is to be considered for admission.

The Council on Dental Education, in its *Requirements for the Approval of a Dental School,* fixes as the minimum basis for admission to an approved dental school the successful completion of two full academic years of work in an accredited college of liberal arts and sciences. This admission requirement has been in effect since 1942. Moreover, these requirements specify that a student must have at least a year's credit in English, biology, physics and inorganic chemistry and a half-year's credit in organic chemistry. The Council suggests, however, that formal credit in biology and physics may be waived for those applicants who have earned a grade-point average of "B" or better and have studied three or more years in an accredited liberal arts college.

Nearly all of the steps leading to the present set of admission requirements have taken place in the last 50 years. These requirements, and those now used


Changes in Admission Requirements to Dental Schools
ADMISSION REQUIREMENTS
Adoption of Dental Aptitude Tests to assist in selection of students
Experimentation with use of Aptitude Tests for admissions
Council on Dental Education prescribes certain courses in 2 yr. predental course
2 yrs. of college work and adoption of 4 yr. dental course
1 yr. College—4 yr. Dental Sch. Course
2 yrs. College—3 yr. Dental Sch. Course
2 yrs. specific training for admission to class A and B schools
Graduation from an accredited high school or academy
4 yrs. of high school
3 yrs. of high school
Certificate of entrance into second yr. of high sch.
Preliminary exam. in English composition, arithmetic, geography, etc.
Good English education
Nothing prescribed
First dental school
1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950
FIFTY YEARS
LENGTH OF DENTAL SCHOOL COURSE
4 yr. course
3 and 4 yr. courses (depending on preparation)
4 yr. course of 32 weeks (each 6 days)
3 yr. course of 36 weeks (each 6 days)
Provision for 4 yr. course of 7 months each (in force only one year.)
3 yr. course of 5 months each
2 terms—course of 5 months each
1 yr. course

by a few of the dental schools that exercise even more rigid predental demands than the ones required by the Council, are vastly different from the requirements imposed upon many of the students who applied for entrance to dental school 50 years ago.

The first dental school was established in 1840, 110 years ago, and for 45 years no scholastic requirements were imposed upon its entrants. The first university dental school, the Harvard Dental School, was opened in 1868 and it also was silent for a long time about specific academic requirements for admission. In 1884, a "good English education"[1] became the prerequisite for admission to at least some of the dental schools. Even this general requirement had to be made more specific and in 1885 a resolution was adopted providing for a preliminary examination including an English composition and examinations in arithmetic, geography, modern history, government and English grammar. Later, efforts were made to add Latin and physics to the requirements.

About 50 years ago, in 1898, the preliminary educational requirement of the colleges associated with the National Association of Dental Faculties was changed to include "a certificate of entrance into the second year of a high school or its equivalent." The one year of high school education remained the educational requirement until the turn of the century, when two years of high school or its equivalent were required, and in 1907 the requirement was again raised, this time to three years of high school education. Changes in requirements were appearing rapidly and regularly during this period and the prerequisite was increased to a full high school course or its equivalent in 1910.

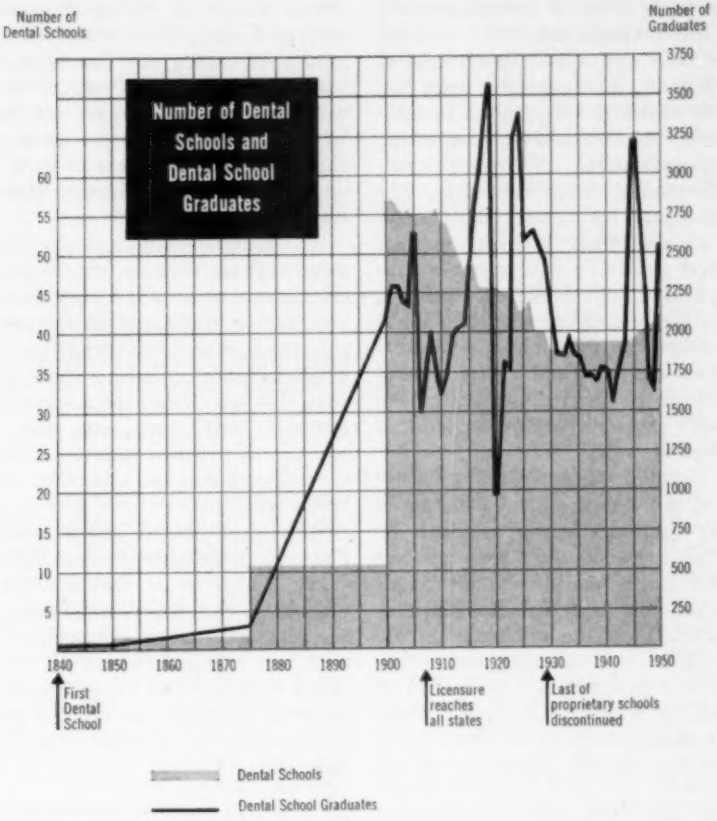
In 1918, the prerequisite of high school training was more tightly defined by requiring graduation from an accredited high school or academy, and the term "accredited" was defined. In 1926, the admission requirements recognized the existence of the four-year dental school course and the three-year dental school course, by requiring high school graduation and one year of predental college education for those entering the four-year dental school plan, and requiring high school graduation and two years of predental college education of those students entering the three-year dental school plan.

The entrance requirements for Class A and Class B dental schools offering a three-year curriculum at this time not only specified two years of predental college education but required "not less than six semester hours of English, six semester hours of inorganic chemistry, three semester hours of organic chemistry, six semester hours of biology or zoology and six semester hours of physics."

In 1934 there were 38 dental schools and of these, 34 were operating on the plan of four years of dental education and one year of predental college training; and four dental schools were operating on the plan of two years of predental college training for admission to three years of dental school education. The following year plans were made to adopt the 2-4 plan and place it in operation with the opening of the academic year 1937-1938.

While a number of schools have employed the waiver clause from time to time, relatively few schools now use it and are therefore admitting only those students who have had at least the subjects specified in the Council's *Requirements*. The Council on Dental Education is constantly reviewing all of its *Requirements for the Approval of a Dental School* and will soon announce a slight change in the wording of the waiver clause so as to apply only to those students with a grade-point average of B or better and who have studied three or more years in an accredited liberal arts college.

For the last 15 years, interest in meth-



ods of selecting students has been on the increase. Some of the schools, such as the State University of Iowa, have been studying the possibility of employing aptitude tests and about five years ago the Council on Dental Education embarked on an experimental program designed to determine the practicability of using aptitude test scores for predicting the performance of dental students. While the dental schools have not always been filled to capacity, the administrators have always been concerned with the relatively high mortality rate of students and have wanted improved methods for predicting the success of the applicant. As a result, some of the admissions officers have asked not only for college transcripts but also for transcripts of high school grades. Some have required letters of recommendation, personal interviews with several of the faculty members or committees and some have required the student to come to the school so that he could demonstrate his manual skill. There is considerable variation in the way that the deans and admissions committees employ these data once they have them at hand.

Since the beginning of the Council on Dental Education's experimental program in aptitude testing, eight schools

are now using a set of examinations to supplement personal interviews and the other records and application forms of the applicants. It is evident from the Council's experimental program in aptitude testing that examinations measuring the applicant's ability, (1) to read scientific information comprehensively, (2) to demonstrate his mental ability, and (3) to solve scientific problems, predict with good reliability his probable performance in the academic type subjects in dental schools. Moreover, the applicant's scores on examinations measuring manual dexterity and ability to visualize patterns predict reasonably well the applicant's probable ability in clinical and laboratory work.

As a result of the aptitude testing experiment, the dental schools have asked that the aptitude testing program be placed on a nation-wide basis so that test scores may be used by the admissions committees along with the other information collected on the applicant at the time he is being considered for admission. Such a program will be placed in operation the latter part of 1950 in order to test those students who are applying for entrance into dental school in the fall of 1951.

These tests will be given at 40 of the dental schools as well as at 33 colleges and universities. The first tests will be administered during the Thanksgiving and Christmas holidays in 1950, with other testing periods in February and April of 1951. The tests will be processed in Chicago and the reports sent to those dental schools who are considering the applicants for admission.

The dental schools employing these test scores will use them in combination with the other records which they have gathered on the applicants. In the same way that the admissions officers do not use any single criterion now as a basis of selection, they will weigh the evidence of the aptitude tests along with the college transcripts, personal interviews, letters of recommendation and any other information available.

Admissions policies and practices have changed considerably during the last 50 years. The next 50 years may see some changes in quantitative requirements but the greatest changes will probably be in two areas: (1) the study of the applicant's aptitudes and the prediction of his potential abilities, and (2) the guidance and counseling of those students who have been admitted.

1. Horner, H. H., *Dental Education Today*, Chicago: University of Chicago Press, 1947.

DENTAL EDUCATION

Maynard K. Hine, D.D.S., M.S., Indianapolis

EVEN to the most casual of observers it is apparent that since the beginning of the twentieth century dental education has undergone radical changes. Noticeable to all are the marked improvements in the quality and quantity of the training of dental students as compared with graduates of 50 years ago.

Comparisons between then and now reveal surprising differences. Most of the technics and methods of treatment taught dental students today have been developed or greatly refined since the turn of the century. For example, no casting procedures were used in dentistry until in 1907,[1] in contrast with the carefully controlled, exacting casting technics routine for freshman students today. Also obvious to all is the superior equipment available for teaching dentistry today. In 1900 it was necessary for students to purchase foot-engines which they carried about

with them; now high speed electric engines are standard equipment. The same comparisons can be made of dental chairs, units, sterilizers and most instruments. Many entirely new treatment procedures have been added to the dental school curriculum as the fund of dental information has increased and as improved methods and materials have been developed.

And the teaching aids! A bulletin from a dental school for the 1900 class proudly stated that in the histology course:

> Photomicrographs showing the development of the teeth and the histological character of the tissues of the body are thrown on the screen by aid of the stereopticon and fully explained.[3]

Today use of individual microscopes, colored slides and movies, silent and sound, are common in dental education. Certainly the educational materials used in dental schools are superior to those used a generation ago.

Another recent development in dental education which is worthy of note is the emphasis now placed on departmentalization into specialties. As the body of dental knowledge increased, it was entirely natural that specialties would develop. Many courses are now being taught by specialists, and students themselves are motivated toward specializing after graduation. The trend toward specialization is reflected in the organization of the dental curriculum, the selection of dental faculty, and even in the design of the modern dental building.

More important, of course, than all the physical improvements, is the gradual change occurring in the philosophy of dental education or, to express it more accurately, the gradual acceptance by most educators of the often expressed viewpoint that dentistry is not a collection of technics, but is essentially a biologic science with its therapeutc procedures basically technical in nature. Although there is still much to be desired, the quality and quantity of teaching in the basic and the medical sciences are improving steadily from year to year.

A very obvious change in dental education has been the lengthening of the dental course and the increase in admission requirements of dental schools discussed by Shailer Peterson in this issue.

Change of Emphasis

One of the more dramatic of the developments in dental education since 1900 is the increased emphasis that is placed upon the biological or medical sciences in the dental curriculum.

Study of bulletins of dental schools does show that the basic sciences were offered in 1900 and before, but such courses were short, sketchy and treated as unimportant. The preoccupation in technics crowded out the medical sciences, and it was not until well into this century that enough scientific evidence had been collected to convince the skeptics in dentistry of the necessity for including sufficient quantities of the basic sciences in the dental curriculum to have a strong influence on dentistry.

Actually, there was much evidence in the literature of the need for a close relationship between medicine and dentistry. Benjamin Rush in 1801 presented a classic description of focal infection from a dental source and insisted that oral health was important in general health.[3] In 1890 W. D. Miller published an article on oral food infection[4] as well as several other articles on oral bacteriology, but these ideas received little attention. Also, Sir William Hunter in 1904 discussed before the British Medical Society the relation of dental disease to general diseases.[5] In 1910 he presented an essay entitled "The Role of Sepsis and Antisepsis in Medicine"[6] which attracted wide attention in the lay press as well as in professional literature. The subsequent flood of discussions on oral focal infection, "septic dentistry," and "septic jew-

Some dental educational leaders at the turn of the century. National Association of Dental Faculties, Saratoga Springs, 1896. 1—Thos. E. Weeks, 2—J. L. Stephens, 3—unidentified, 4—S. W. Foster, 5—W. E. Griswold, 6—M. E. Marshall, 7—T. W. Brophy, 8—W. H. Morgan, 9—A. O. Hunt, 10—H. L. Ambler, 11—D. J. McMillen, 12—E. C. Kirk, 13—F. L. Hise, 14—C. N. Peirce, 15—W. J. Brady, 16—G. H. Wilson, 17—H. W. Morgan, 18—C. J. Essig, 19—A. J. Brown, 20—H. C. Thompson, 21—D. M. Cattell, 22—F. M. Allen, 23—L. M. Cowardin, 24—B. Holly Smith, 25—R. N. Kesterson, 26—Louis Ottofy, 27—J. B. Hodgkins, 28—G. S. Shattuck, 29—W. E. Harper, 30—Theo. Menges, 31—F. Peabody, 32—J. P. Gray, 33—W. C. Barrett, 34—J. Taft, 35—E. M. Kettig, 36—H. B. Tileston

elry" of the oral cavity emphasized and dramatized the importance of increasing the medical knowledge of dental students. At about the same time experiments in roentgenology were proving that chronic periapical infections could be located before extraction, thus giving dentistry a method of locating oral focal infection.

By the second decade of this century, a sufficient volume of truly scientific evidence had been collected to justify an increased emphasis on the medical sciences in the dental curriculum, and hence to help justify lengthening the dental curriculum. Increase of the medical content of the dental curriculum has been carefully controlled, thus far, with the result that there has been little evidence of the overemphasis on purely medical teaching in the dental schools in this country. It is interesting to note that in 1949, a group of English dentists, discussing American dental education, agreed "that too much emphasis in Britain on semi-medical training and not enough on pure dentistry" was given. They stated further that:

> This state of affairs is unfortunate, and does not obtain in the U.S.A., where dental education produces a dentist who enjoys a pride in his profession, a certain degree of autonomy and a relatively higher status in the community as a result.[7]

Influence of Organizations

Several dental educational organizations must be mentioned because they have been active in improving both the quantity and the excellence of dental training. The first one to organize was the National Association of Dental Faculties (1884) which consisted primarily of deans of the dental schools. The National

School of Dental Technics was founded in 1893, primarily for teachers. By 1908 it was respected by almost everyone interested in dental education, and it voted to change its name to the Institute of Dental Pedagogics. In 1914 it became the American Institute of Dental Teachers.

The third educational organization to be formed (1908) was the Dental Faculties Association of American Universities. Its members were deans and teachers of six dental schools which were in universities; its objectives were the promotion of dental education to a position where dentistry could be accepted without question as an integral part of universities; the increase of entrance requirements, and the active resistance of proprietary control of dental education.

The three organizations mentioned above and the Canadian Dental Faculties Association, founded in 1920, made serious efforts to influence and direct the progress of dental education, and they contributed much to the general upgrading of dental teaching. In 1923 these four organizations merged to form the American Association of Dental Schools which, through its annual meetings, its active committees, and its *Journal of Dental Education*, continues to give helpful stimulus to dental education.

The work of the Curriculum Survey Committee of the American Association of Dental Schools mentioned by Harlan H. Horner in this issue is worthy of special note because of its influence on the dental curriculum.

The American Association of Dental Schools also sponsored publication of a book on *Teaching in Colleges and Universities, With Special Reference to Dentistry*.[8] This book, which deals with methods of teaching, is a notable contribution to education and should influence beneficially the teaching in dental schools for many years to come.

Another organization influential in dental education was the Dental Educational Council of America, organized in 1909 "for the advancement of dental education and the unifying of the standards of the various national bodies of the dental profession."[9]

In 1937 this group was reorganized into the Council on Dental Education, which is composed of representatives from the American Dental Association, the American Association of Dental Schools, and the National Association of Dental Examiners. The Council has been active ever since and its activities have been accelerated by the appointment of a full-time executive secretary. The first to be appointed to this office was Dr. Harlan H. Horner to whom much credit is due. His book, *Dental Education Today*,[9] rates as one of the most valuable books on dental education ever written. Dr. Horner retired in 1948 and the present executive secretary is the able Dr. Shailer A. Peterson, well known for his activities in the field of educational measurements. The Council continues to be one of the most powerful influences in dental education today.

On October 19, 1940, the Council adopted requirements for the approval of a dental school.[10] These requirements are widely accepted as standards for dental schools today.

Using these general requirements, the Council in the years 1942-1945 made a truly exhaustive study of dental schools and announced, in March 1946, that of the 38 dental schools in operation, 23 were approved, and 14 were provisionally approved. (One other dental school had been approved, but the approval was suspended in 1945 because of administrative reorganization.[9]) By March 17, 1950, 32 schools had been fully accredited, 6 provisionally accredited, one (Washington) accredited for the first two years, and two new schools had not yet been examined.[11] The results of inspections and studies of dental education have been in the main gratifying, and have aided the schools themselves in improving their status.

The general acceptance of the Council's study by dental educators and their serious attempts to correct the deficiencies discovered speaks well for the Council's work. It also is a promising sign for continued progress of dental education in the future.

In any discussion of the development of dental education in this century one must mention the influential Bulletin No. 19 of the Carnegie Foundation.[13] Since Dr. Horner has commented on this excellent report, further mention of it need not be made here except to say that the analysis of dentistry made by Dr. Gies in the Carnegie report resulted in positive pressures which helped evaluate the status of dental education.

Another obvious force in improving dental education is the activity of the national dental organization and the various dental specialty organizations. The American (formerly National) Dental Association has taken the lead, but many of the specialty groups and honorary societies have contributed a great deal by influencing their members (many of whom are teachers) and the profession in general, by dissemination of knowledge through their journals and regular scientific meetings. These organizations have proved to be forceful aids to dental education and, particularly in recent years, have furnished aggressive leadership in the promotion of better standards for dentistry.

Dental education has been helped, too, by the improved status of dental journalism. Although the older dental journals are most interesting to read, even a casual perusal will prove to anyone that the better dental journals are now on the average superior to the best journals of the last century, both in content and in format. The article by Gardner P. H. Foley in this issue describes effectively the development of dental journalism in the United States.

The International Association for Dental Research should be mentioned as a potent factor in furnishing leadership in the field of dental research, as well as serving as a clearing house for research in this country. It was organized December 10, 1920, "to promote research, nothing else."[13] At its first general meeting in December 1922, two papers were presented by two men,[14] and in the 1950 meeting, 75 papers were presented, written by 87 men.[15]

Research has also produced superior instruments and machines for dental treatments. For example, when the foot-engine mentioned earlier came into general use, it was hailed as a great advancement for dentistry, and indeed it was. Of course, in this century electric motors, adapted to dental use, became available as electric power became generally distributed, so the foot-engine is relegated to the museum. Now there are indications that the dental engine may be supplemented by a new machine capable of cutting tooth structures and polishing teeth with an abrasive material carried in a blast of compressed gas.[16] What effects this new development will have on the teaching in dental schools (and the dental school budget) is not known. New discoveries are usually quickly adapted to dentistry and are then reflected in the teaching program of dental schools.

However, dental research has done more than merely produce additional facts for teachers to include in their courses. The search for new technics and new materials always results in development of a critical attitude, in stimulation of dental teachers to further learning and in creation of the healthy viewpoint that dental science is progressing and improving. A dental student who has an opportunity to observe research in progress is more apt to realize that dental science is not static and that if he wishes to keep up with dentistry, he must continue to study even after graduation. Dental research must be included in a list of forces which have resulted in improvement of dental education.

1. Johnson, G. N., Twenty-five Years in Retrospect and Twenty-five Years in Prospect. *J.A.D.A.* 20:1810 (Oct.) 1933.

2. *Bulletin of Indiana Dental College* for 1900-1901.

3. Goodman, N. G., *Benjamin Rush*, Philadelphia: University of Pennsylvania Press, 1934. (Cited by Gillett, H. W., Fifty Years of Dental Progress. *D. Cosmos* 78:160 (Feb.) 1936.)

4. Miller, W. D., The Human Mouth as a Focus of Infection. *D. Cosmos* 33:689 (Sept.) 1891.

5. Hunter, William, Discussion of Oral Sepsis as a Cause of Disease in Relation to General Medicine. *Brit. M. J.*, 2:1358 (Nov.) 1904.

6. Hunter, William, Role of Sepsis and Antisepsis in Medicine and the Importance of Oral Sepsis as Its Chief Cause. *D. Register* 65:579 (Dec.) 1911.

7. Leatherman, G. H., Dental Education: an Aspect of it With Reference to the American Training. *Brit. D. J.* 86:88 (Feb.) 1949.

8. Blauch, L. E., *Teaching in Colleges and Universities: With Special Reference to Dentistry*, Indianapolis: American Association of Dental Schools, 1945.

9. Horner, H. H., *Dental Education Today*, Chicago: University of Chicago Press, 1947.

10. *Requirements for the Approval of a Dental School.* The Council on Dental Education of the American Dental Association. Chicago: American Dental Association, 1940.

11. Peterson, S. A., Personal communication.

12. Gies, Wm. J., *Dental Education in the United States and Canada*, New York: The Carnegie Foundation for the Advancement of Teaching, 1926.

13. Gies, Wm. J., The International Association for Dental Research, a Brief Outline of Its Organization and Development. *J. D. Res.* 6:101 (March) 1924.

14. Gies, Wm. J., A Brief Review of the History of the International Association for Dental Research. *J. D. Res.* 11:55 (Feb.) 1931.

15. Official Program of the 1950 Meeting of the International Association for Dental Research, prepared by Dr. E. H. Hatton, Secretary.

16. Black, R. B., Technic for Nonmechanical Preparation of Cavities and Prophylaxis. *J.A.D.A.* 32:955 (Aug.) 1945.

DENTAL TEACHERS AND THEIR PREPARATION

Lloyd E. Blauch, Ph.D., Washington, D. C.

About 2,300 men and women are serving on the faculties of the dental schools in the United States. Approximately 500 are whole-time teachers, 300 are whole-time teachers in colleges and universities but devote only a part of their time to teaching dental students, and 1,500 are part-time teachers, engaged in the practice of dentistry. During the past quarter of a century there has apparently been no great change in these numbers. There is reason to believe, however, that considerable progress has been made in the service rendered by the teachers.

Survey of 1926

When William J. Gies, in 1926, reported the results of his extensive survey of dental education in the United States and Canada[1] he gave special attention to the teaching in dental schools. He reported that the basic sciences were "tolerated rather than taught in some schools," that instruction in these subjects was often poor because the teachers were "either indifferent when drafted from the medical staff, or incompetent when recruited from other sources." He said also, (1) that the instruction in dental technology was "usually uninspiring and listless and lacking in effectual organization" and (2) that it was "characterized by unprofitable repetition," chiefly because many of the teachers, who were practitioners on part-time and half-hearted service, had only empirical knowledge of their subjects and proceeded "as they might if they were training apprentices in tinkering."

The unfortunate conditions, Dr. Gies thought, would

> . . . probably continue until, in leading universities, the salaries of the teachers of dental subjects are made commensurate with the importance and value of good teaching and research in the dental schools; until fellowships are established to help dental teachers to engage in special studies of education; and until adequate opportunities for systematic advanced work in dentistry, with eminent teachers and investigators, are created.

The universities most competent to promote these objects, he found, had done nothing important to advance them.

Such were Dr. Gies' gloomy conclu-

sions. Since 1926 there has been considerable improvement in dental education as is shown by other articles in this issue. Some of the suggestions and recommendations made by Dr. Gies have been followed and with good results.

Survey of 1947

In his excellent comprehensive work entitled *Dental Education Today* (1947) Harlan H. Horner,[2] former secretary of the Council on Dental Education, reported that, of the 2,280 dental teachers, 409 held master's degrees and 276 held doctor's degrees other than degrees in dentistry or medicine. Although most of these graduate degrees were held by teachers of the basic sciences, 294 were held by clinical teachers. Dr. Horner reported also that during a recent five-year period 37 per cent of the clinical teachers and 67 per cent of the teachers of basic sciences had made substantial contributions to the professional and scientific literature of dentistry.

Programs for Preparing Dental Teachers

As indicated above, a number of universities, through their schools of dentistry, have established graduate instruction for the purpose of training research workers and teachers. Several other programs have been in operation in recent years through which a number of dental teachers have been prepared. Among these is one at the Yale University School of Medicine, inaugurated in 1929. Of the 16 fellows who had completed their courses by May 1949, seven had gone into full-time academic work in dental institutions, four of them on a full professor rating. Perhaps the best known of these programs was begun in 1930 at the School of Medicine and Dentistry of the University of Rochester. Up to May 1949 a total of 46 fellows had enrolled and 19 had received graduate degrees. With but a few exceptions, these graduates were serving on dental faculties. The Walter G. Zoller Memorial Clinic, established at the University of Chicago in 1936, has also prepared a number of dental teachers. By May 1949, 20 fellows had been enrolled. Eleven of them had received graduate degrees and most of these were teaching in dental schools.

Since 1944 the Surgeon General of the United States Public Health Service has been authorized to award research fellowships to brilliant and promising students and scholars in medical and allied fields. The field of dentistry is included in the provision. Special recognition has been given to dentistry through the creation of the National Institute of Dental Research in 1948. Here is offered another opportunity whereby dental graduates may prepare themselves for research and teaching.

Other Factors

In addition to the developments described above which are helping to improve dental teaching, several others may be noted. Certainly one of these is the stimulation of dental research through the International Association for Dental Research and its excellent publication, the *Journal of Dental Research* discussed by Drs. Horner and Hine and by Mr. Foley in this issue.

A report made to the American Association of Dental Schools in 1949 by its Committee on Teaching showed that a majority of the dental schools in the United States and Canada have employed specific means for improving their teachers and teaching. Among these means are: providing time and facilities for research; furnishing teaching aids; providing special lectures and courses on teaching for the faculty; holding faculty meetings to discuss methods of teaching and examining; encouraging members of the faculty to pursue graduate work;

and paying travel expenses for faculty members to attend educational meetings.

Conclusion

The developments described in this article indicate that there has been considerable improvement in dental teaching during the past quarter of a century or more. There is little ground, however, for complacency. Dental schools currently experience difficulty in recruiting a sufficient number of capable and inspiring teachers, and not enough are being well trained for the future need. There is still too much reliance on part-time teachers. Not enough is being done by dental schools to discover likely students for teaching careers and to encourage them in preparing for such service. Not enough effort is being made to provide the specialized training a teacher needs to perform well his function as a guide to, and instructor of, students. And finally, not enough fellowships with sufficiently large stipends are available for graduate students who would prepare themselves as teachers.

1. Gies, W. J., *Dental Education in the United States and Canada*, New York: The Carnegie Foundation for the Advancement of Teaching, 1926.

2. Horner, H. H., *Dental Education Today*, Chicago: University of Chicago Press, 1947.

3. Blauch, L. E., *Teaching in Colleges and Universities; With Special Reference to Dentistry*, Indianapolis: American Association of Dental Schools, 1945.

AUXILIARY DENTAL PERSONNEL

J. Ben Robinson, D.D.S., Baltimore

THE introduction to dental office management of certain types of dental office and dental laboratory assistants during the half century about to close, has produced important changes in the administration of dental practice. The rapid growth in the numbers of these assistants has been stimulated by the readiness of the dentist to delegate to others many essential details of office management and of laboratory procedures which can be transferred with confidence to specially trained personnel. The number of persons engaged in the performance of these special tasks has multiplied to the extent that their aggregate efforts have aided materially in increasing the production of the quantity of oral health services now available to the public.

The auxiliary personnel employed in support of dental practice falls into two general classes which are identified by the nature of the work that each performs in relation to the dentist. The first class consists of those persons who cooperate with the dentist by assuming responsibilities for the details incident to office management, and by performing certain extraoral tasks which facilitate the production of restorations and appliances used in patient treatment. These groups are identified as dental office assistants and dental laboratory technicians. The second class consists of those persons who assume intraoral responsibilities by undertaking to perform operations which are traditionally and legally a part of dental practice, and who may be regarded more as adjuncts to dental practice than as assistants in charge of office administration. The dental hygienist represents this class.

Dental Office Assistant

At the turn of the century few office assistants were to be found in dental offices; today almost every dental office has at least one competently trained assistant who is, in effect, a business manager. In the main this assistant looks out for the careful supervision of the office,

assumes the responsibility for all business details and keeps careful records of all transactions for the benefit and information of the dentist. Frequently the general office assistant acts also as an operating-room assistant. In many instances the dentist is able to organize his office staff to include a chair-side assistant as well as a secretarial assistant. In one or both instances the effect of this arrangement on quantity production of oral health services is very marked. Indeed there is reason to believe that the tremendous growth in the number and efficiency of dental office assistants has greatly increased the productivity of the dental office in 1950 as compared to its capacity for service in 1900.

So far no specific program of pre-service training for the dental office assistant has been established by dental educators. The basic training of the assistant usually consists of the conventional commercial training received in high school, followed by special instruction offered by the dentist in his office and by the experience gained in on-the-job training. Efforts have been made to induce dental educators to offer special courses for dental office assistants, but without much success. Courses of training have been established in some vocational high schools and in some junior colleges, but these are merely occasional programs and do not meet the demands. It is probable that the continuing demand for the services of the dental office assistant, and a better understanding of the educational standards necessary for her proper training, will combine finally to stimulate dental educators to offer well-balanced training courses for these persons.

Dental Laboratory Technician

The dental laboratory assistant, or prosthetic technician, originated during the latter half of the nineteenth century in the offices of the more progressive dentists, where they worked under the immediate supervision and direction of the dentist. The number of dental laboratory technicians prior to 1900 was small, and at the opening of the twentieth century their numbers had not grown to any sizable proportions.

The training of these early dental technicians was strictly of the apprenticeship type and the instruction offered them was conducted in a manner meant to satisfy the predilections peculiar to the particular dentist for whom each was to work.

During the first decade of the present century, a plan was developed under which some of the experienced dental technicians offered to serve the laboratory needs of more than one dentist. The growing demands made on the chair-side time of the operator caused many dentists, who had formerly fabricated all their restorative appliances, to take advantage of the services of these free-lance technicians. As a consequence, dentists gradually increased their patronage of independent technicians who, because of the freedom of conditions under which they were able to work, developed laboratory centers that grew rapidly into what we now know as the commercial dental laboratory industry, the patronage of which has become almost universal during this half century.

The recruitment of technicians to carry on the dental laboratory industry has depended on the apprenticeship system of training. There is no method employed in the selection of candidates for training except trial and error, nor is there any program of instruction set up for their education beyond personal guidance in teaching them to perform routine technical procedures.

As a result of the demands for educational opportunities made by veterans following the close of World War II, a large number of proprietary schools for the training of dental technicans sprang up throughout the country. The Council on Dental Education expressed disap-

proval of the courses of instruction offered in such institutions and suggested that encouragement be given to the establishment of technician training centers in nonprofit educational institutions. In 1948 two such programs were offered in dental schools and two were offered under the auspices of a state educational agency. At its annual meeting in 1948, the House of Delegates of the American Dental Association approved a set of requirements for the accrediting of a school for the training of dental laboratory technicians. The proposal prescribed graduation from a four-year high school course as the minimum for admission to study, and two full academic years in the technical curriculum as the minimum length of the training course.

The almost complete isolation of the activities of the commercial dental laboratory from the problems in the dental office, as the situation now exists, and the willingness of a large majority of dentists to abandon vitally important duties to those not qualified to assume them (a situation that for years has been growing in all the states), cannot contribute much of lasting value to the dental profession, to the technician, or to the patient.

Because of the careless attitude of the dentist, the laboratory technicians have been permitted to assume a measure of independent authority which now poses a serious problem with which the dental profession must cope. Actually many laboratory technicians now look forward to licensure as the first step toward professional status. This thought is finding expression in many sections of the United States and has actually reached the point in one state where the technicians have been able to enlist formidable political support for the advancement of their purposes.

The answer to this situation is clear. The dental profession is now obliged to address itself to the task of gradually bringing the prosthetic technician back into the private laboratory, and to arrange for this traditional office assistant again to work under the personal supervision, direction and control of the dentist. In no other way can a truly scientific health service be provided the patient and in no other way can the profession hope to retain control over this type of oral health care for the public.

Dental Hygienists

The formally trained dental hygienist is a product of the first half of the twentieth century. She was introduced to the dental profession by Dr. A. C. Fones of Bridgeport, Connecticut, who organized a school for hygienists in 1913. Thirty-three students enrolled in the first class and 27 graduated as dental hygienists in 1914.

The next step in the education of the hygienist came with the founding of the New York School of Dental Hygiene as a division of Hunter College, in 1916; in this same year it became an integral part of the Vanderbilt Clinic of Columbia University. The educational opportunities for training hygienists were further advanced by the founding of the Forsyth Dental Infirmary for Children and the Eastman Dental Dispensary. The purpose of each of these institutions was to provide opportunities for children to secure needed treatment of oral defects, particularly with the view toward prevention of oral diseases. Curriculums of one year's length were inaugurated in both these institutions in the fall of 1916 for the training of dental hygienists. Similar courses were soon established in many nonprofit institutions, particularly in dental schools. These courses have grown until now, in 1950, there are 16 recognized schools that offer courses for the training of dental hygienists.

The first state to amend its dental law to legalize the dental hygienist was Massachusetts, in 1915; this action was followed by that of New York in 1916. To date 45 states and the District of Co-

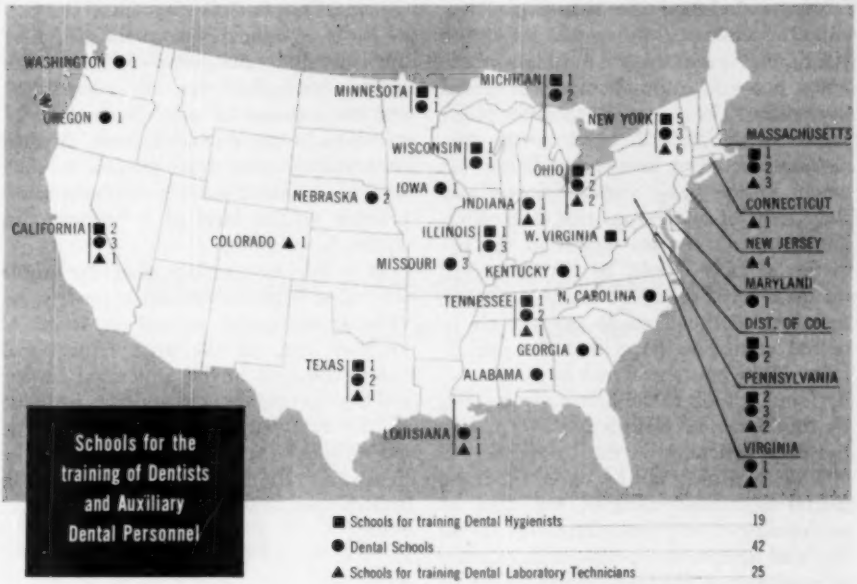
lumbia have legalized this type of dental practice. The amendments to dental practice acts have all stipulated, in effect, that the dental hygienist shall work under the immediate supervision and direction of the dentist and shall be permitted only to clean and polish the exposed surfaces of the teeth.

The original purpose of the plan to educate dental hygienists was to provide specially trained dental personnel who could clean the teeth of school children, could instruct the child in the practice of personal oral cleanliness and could guide him in the selection of a good diet that would reasonably ensure the health of the dental organs. It was thought that the hygienist would be able to teach effectively the principles upon which good oral health depends, to teach the child good health practices that might become habitual, and to teach the relationships and interdependence of oral and general health. It was assumed that if these purposes could be achieved, by whatever means employed, the future oral health of the individual would be reasonably well safeguarded.

As a consequence of the appeal made by this arrangement, a number of the states and many of the larger communities of the country included as basic in their oral health programs those aspects of oral health care in which it was thought the hygienist was proficient. But the more important requirements for the treatment of progressive dental caries, for the treatment of other oral diseases and for competent attention to the relation of good health to the general development of the child were not provided for in these programs. Although some good was accomplished by this school clinic plan under the management of the hygienist, and although the hygienist is still a useful adjunct to dental health programs in the schools, the policy of administering school clinics under the aegis of the hygienist has not produced the beneficial results expected of it by its founders. As a consequence, state and local dental health administrators have found it necessary to substitute programs of restorative dentistry which center primarily about the services of the dentist and which combine restorative procedures with the prophylactic and educational aspects of the problem.

The production and distribution of dental hygienists during the past 35 years offer scant encouragement to the hope that she may ever become a strong factor, nationwide, in oral health care and health education. An accurate record of the number of hygienists that have graduated from hygienist schools during the past 36 years is not available. In 1946, 30 years after the founding of schools for hygienist education, a survey was conducted by the American Dental Hygienists Association to secure comprehensive data about dental hygienists which would be helpful in a study of her position. The committee making the study used a mailing list made up from the registered dental hygienists reported by state departments of registration. According to these records 5,302 hygienists were found to be registered in the United States in 1946. Of the 1,663 who answered the questionnaire used in the survey, only 1,192 responses could be used in determining the distribution of dental hygienists. The study showed that 55.7 per cent were in private dental offices, that 26.2 per cent were in school clinics, that 8.8 per cent were in the employ of the federal government, including the armed services, and that 9.3 per cent were employed in hospitals, in industrial clinics, in part-time practice, and so forth.

The study revealed also that 1,102 hygienists had had one or more years of college training before beginning the hygienist course. It also revealed that as the length of college experience increased, those involved were more and more inclined to devote their time to work in school clinics, and as the college training decreased to the high school minimum the


WASHINGTON ● 1
OREGON ● 1
CALIFORNIA ■ 2 ● 3 ▲ 1
COLORADO ▲ 1
NEBRASKA ● 2
MINNESOTA ■ 1 ● 1
IOWA ● 1
MISSOURI ● 3
WISCONSIN ■ 1 ● 1
MICHIGAN ■ 1 ● 2
ILLINOIS ■ 1 ● 3
INDIANA ● 1 ▲ 1
OHIO ■ 1 ● 2 ▲ 2
W. VIRGINIA ■ 1
KENTUCKY ● 1
TENNESSEE ■ 1 ● 2 ▲ 1
N. CAROLINA ● 1
GEORGIA ● 1
ALABAMA ● 1
TEXAS ■ 1 ● 2 ▲ 1
LOUISIANA ● 1 ▲ 1
NEW YORK ■ 5 ● 3 ▲ 6
MASSACHUSETTS ■ 1 ● 2 ▲ 3
CONNECTICUT ▲ 1
NEW JERSEY ▲ 4
MARYLAND ● 1
DIST. OF COL. ■ 1 ● 2
PENNSYLVANIA ■ 2 ● 3 ▲ 2
VIRGINIA ● 1 ▲ 1
Schools for the training of Dentists and Auxiliary Dental Personnel
■ Schools for training Dental Hygienists 19
● Dental Schools 42
▲ Schools for training Dental Laboratory Technicians 25

hygienist gravitated away from school clinic employment and toward dental office practice. Relatively high standards established by local authorities for appointment to school clinics would account in part for these trends. However, in view of the original purpose in founding the hygienist movement, these figures are significant.

Educational Standards.—Apparently the greatest weakness in the dental hygienist program has been the failure of those responsible for her training to advance to a substantial level the educational standards fixed for the vocation both as to the requirements for admission to study and as to the academic soundness of the curriculum set up for the training course. Graduation from high school and one year in the hygienist curriculum was the standard fixed in 1913; there it stayed officially until 1947, and there it remains in some hygienist schools today. It would seem that the powerful force of frontal progress in general education on all levels during the past 40 years would have had some effect on improving the situation and that the hygienists themselves, the dental educators and the dental practitioners would have recognized the necessity at some point along the line for review and for revision of the doubtful standards that have obtained.

During the past decade a number of changes have been made in the hygienist curriculums in the several dental schools. The length of the training course in the majority of schools has been increased from one to two years, while in some schools special courses of greater length have been inaugurated to meet the demands of some health departments and the requirements of some public school systems. However, none of the hygienist schools have cared to advance the basic pre-hygienist education standard beyond the high school level.

In 1947 the Council on Dental Education of the American Dental Association

recommended and the House of Delegates approved a minimum admission standard of graduation from high school and a two-year training course for dental hygienists. The Council prescribed the courses which should constitute the curriculum, including in it the types and the extent of the basic science courses and the extent of clinical courses, and stipulated that all courses taught in the hygienist schools should be "administered on the level of a college discipline." The members of the Council and leaders in dental education hope that the adjustment of the courses offered in the several hygienist schools to the standards adopted by the House of Delegates will improve hygienist education in the United States.

The hygienist, unlike other auxiliary dental personnel, assumes the duty of performing an important intraoral operation and accepts the specific responsibility of teaching to children the meaning of good health and the conditions under which good health may be had. In order to accomplish these purposes it follows, then, that she must possess a reasonably sound liberal and scientific education. The mere apparently successful performance of the mechanical operation of cleaning the teeth cannot be accepted as the criterion by which the true competency of the hygienist can be judged. The standards of quality and quantity of the preliminary education of the candidate, and the breadth, depth and thoroughness of the formal curriculum set up for training the hygienist must indicate her fitness to engage in effective health work. This program involves recognition of the intellectual maturity and scholastic achievement of the candidate, the adequacy of the several basic science, technical and related courses included in the curriculum, and the thoroughness of instruction offered in classroom, laboratory and clinics, all of which must combine to ensure the attainment of a "college discipline." If the hygienist education program is viewed objectively from the viewpoint of the currently basic educational qualifications of the candidate, the scope of the science courses prescribed for the curriculum, and the amount of time devoted to instruction in the several courses, it must be admitted that those trained in such a manner cannot achieve scholastic competence on the level of a "college discipline."

It is fair to conclude that the whole scheme of hygienist education must be reviewed again and revised in terms of realities and of the true educational values involved in the prescribed course, and that important changes must be made in the total education program if the hygienist is to serve the school child, the dentist and the public as a well informed and competently trained health worker.

Summary

Aside from the strong tendency toward specialization which has developed among dentists, the most significant changes in dental practice in the first half of the twentieth century have been the introduction of the dental office assistant, the acceptance of the organization of commercial dental laboratories and the utilization of dental hygienists. The second and third groups pose serious problems which must be reconsidered thoughtfully and courageously by the dental profession. Dental laboratory technicians have presumed to seek legal recognition of their qualifications to practice dentistry based on their alleged abilities to perform competently intraoral services for the patient. Their purpose is dramatically illustrated by recent developments in the state of Connecticut where, under pressure from the dental technicians, the governor has asked that a commission be appointed to consider ways and means of licensing them. The theory on which the concept of the hygienist was founded has been extended to include operative dentistry for chil-

dren. The Forsyth Dental Infirmary for Children has announced a scheme for training a sublevel group called "dental nurses" for this purpose. The Massachusetts legislature has authorized the project. Both these ventures are in essence direct attacks on the basic integrity and usefulness of the dental art. If these two attacks succeed, dentistry as an institution will be so weakened that its usefulness will be irrevocably injured. The dental leaders who will guide the course of dentistry in the next half century must accept the responsibilities for adjusting these difficult situations in the interest of the public good.

THE NATIONAL BOARD OF DENTAL EXAMINERS

Walter H. Wright, Ph.D., New York City

THE National Board of Dental Examiners had its beginning in discussions which began to bear fruit among the members of the National Association of Dental Examiners as early as 1924, in Dallas, Texas. Following this meeting, the subject became one of such concern as to merit discussion at succeeding meetings until the National Board was finally established in 1928 by action of the Delegates of the American Dental Association. Five years went by before the National Board of Dental Examiners conducted its first examination in 1933, and seven more elapsed before it became affiliated with the American Association of Dental Examiners, in 1940.

At present, the National Board is a council of the American Dental Association composed of 25 members, 9 of whom are councilmen and 16 consultants. The American Dental Association, the American Association of Dental Examiners, and the American Association of Dental Schools are each represented on the National Board by three councilmen and four consultants. Likewise, the United States Army, the United States Navy, the United States Public Health Service and the United States Veterans Administration are represented each by one consultant.

Through the years, the work of the National Board of Dental Examiners has merited increasing approval, and at present 21 state boards and the U. S. Public Health Service accept the certificate or grades in lieu of their own theoretical examinations. This widespread approval justifies the purpose for which the National Board was established.

Those who participate in the work of the National Board strive to set up a qualifying examination in the theory of the science of dentistry that will provide unequivocal evidence of the high scholastic attainment of those candidates who pass the Board's examinations.

In its zeal to uphold its standards, the Board, at times, has had an excessive number of failures. This exacting attitude has tended to create confidence in the Board's objectives, and has increased respect for the Certificate of Qualification as is shown by the recent marked increase in the number of applicants for the National Board examinations.

The Board, with its representative membership, has not interfered with state's rights. In fact, the acceptance of the Certificate of Qualification rests with each state board of dental examiners in keeping with its state dental licensing law. When the National Board was first organized, it planned to include examinations in the practical and clinical areas of dentistry. This plan never materialized, and all practical examinations for state licensure are now under the supervision of respective state examining boards.

The final decision as to the candidate's fitness to practice dentistry rests with each state board of dental examiners.

On the other hand, the National Board, representing all related areas of organized dentistry and enjoying a broad point of view, has been able to set up an equitable and uniform evaluation of the theoretical qualifications of candidates from all the states. The Board's activities tend to increase scholarship among dental students and this in turn assures a greater number of better trained candidates from which the states may select their future dentists.

Although the work of the National Board of Dental Examiners is exacting and recurrent, the details are carried out by its efficient secretary, so that the profession is scarcely aware of its functioning. The members meet once and sometimes twice each year for the purpose of conducting the business of the Board. Examinations require two days and are held twice each year in April and December in designated dental schools of the United States. The examination is divided into two parts and a fee of $15 is charged for each part. Part I includes subjects usually completed at the end of the sophomore year, while Part II relates to theoretical aspects of subjects taught in the clinical years. No practical clinical examinations are given. Undergraduate candidates must be citizens of the United States and they must be certified to the Board by the deans of their respective dental schools. Practicing dentists must meet special requirements in order to be admitted to the Board's examinations.

The questions used for these examinations are edited and approved by a committee and referred to a specialist in each subject for evaluation. Each examination is given under a supervisory board appointed by the secretary and chairman of the National Board and conducted simultaneously throughout the United States. Examinations are graded by recognized authorities and those under 70 per cent are regarded by another authority. The final grade is determined by averaging both grades. The qualifying certificate of the Board is not transmitted to the candidate until he has been in practice for three years, and then only upon evidence of moral and ethical standards of professional conduct.

A dentist who has received the Certificate of Qualification may not be the holder of more than three active state licenses at the same time, and the National Board will not certify any applicant to more than three state boards of dental examiners.

The increasing confidence which the National Board has enjoyed is indicative of its growing favor and usefulness among the profession of the several states. Its respect for states' rights, its uniform and high standards and the widespread interest it creates among dental students and recent graduates are testimony to its worth and assurance of its future support and development by the profession.

NOTABLE CONTRIBUTORS

to Fifty Years of Progress

1900 ★ 1950

THE PROGRESS WHICH DENTISTRY HAS ACHIEVED DURING THE PAST 50 YEARS HAS BEEN MADE POSSIBLE BY THE DREAMS, INITIATIVE AND LABOR OF THOUSANDS OF DENTISTS AND OTHERS IN EVERY STATE AND COMMUNITY OF THE NATION—MEN AND WOMEN WHO HAVE COOPERATED UNSELFISHLY ONE WITH ANOTHER IN SCHOOLS, INSTITUTIONS, LABORATORIES AND PRIVATE OFFICES TO IMPROVE THE SERVICES OF THE PROFESSION AND THE HEALTH OF THE PUBLIC.

AMERICAN DENTISTRY IS PRIVILEGED TO PAY ITS RESPECTS THROUGH THE PAGES OF *The Journal* TO ITS MEMBERS AND TO OTHERS IN ALLIED PROFESSIONS WHO HAVE CONTRIBUTED SO RICHLY TO ITS PROGRESS. THROUGH THE COOPERATION OF CONSTITUENT SOCIETIES THE FOLLOWING MEMBERS HAVE BEEN HONORED, BECAUSE OF THEIR OUTSTANDING SERVICE, TO REPRESENT THEIR FELLOW MEMBERS IN THIS MEMORIAL SECTION OF THE *Mid-Century Issue* OF *The Journal.*

AIR FORCE

Major General George R. Kennebeck has the distinction of being the first chief of the United States Air Force Dental Service and of being the first Air Force dental officer to attain his grade. In this capacity he has directed in a remarkable manner the organization, growth and development of the Air Force Dental Service.

General Kennebeck

General Kennebeck received his D.D.S. degree from the Dental College, University of Iowa, in 1916, and was appointed a first lieutenant in the Army Dental Corps in 1917. His military service included assignments with the A.E.F. in Siberia, the Philippine Department and in the Panama Canal Zone. He served as Professor of Military Science and Tactics at his alma mater from 1929 to 1933.

In 1949 General Kennebeck was appointed Chief of the Dental Service, Office of the Air Surgeon in Washington, D.C., transferring from the Army when the Air Force Medical Service was established. He has demonstrated brilliant staff planning, a high degree of professional skill and an exemplary devotion to duty. He has been a leader in Air Force dental research, and has succeeded in promoting an exceptionally high state of morale among Air Force dental officers.

General Kennebeck is a member of the American Dental Association, the International College of Dentists and the Omicron Kappa Upsilon national honorary fraternity.

ALABAMA

Olin Kirkland, as a young man, intended to study medicine, but through his friendship with a dentist, E. N. Passmore of Abbeville, Ala., he was persuaded to enter the dental profession. In 1899 he chose Atlanta Dental College for study, and was graduated with high honors in 1902.

Dr. Kirkland opened his office in Montgomery, Ala., and continued in general practice until 1912, at which time he restricted his work to periodontia. He has since become internationally known in this field, and is perhaps best known for his perfection of the operation and technic which bears his name. He has imparted his knowledge through his writings, lectures and outstanding motion pictures on the subject.

Dr. Kirkland's interest in his profession and his outstanding ability have resulted in his holding many prominent positions in organized dentistry. In 1924 he served as president of the Alabama Dental Association and the American Academy of Periodontia. He is one of two Alabama members who have served as vice-presidents of the American Dental Association and is the only one from that state to

O. Kirkland

serve as an A.D.A. trustee. He is a Fellow of the International College of Dentists and has served on the American Board of Periodontology.

Dr. Kirkland's many achievements and contributions to dentistry during the first half of the century mark him for an important place in dental history. At 74 years of age, he is an active and respected member of the profession.

ARIZONA

William J. Johnson was born September 9, 1893, in Memphis, but it was in his adopted state of Arizona that he reached prominence in the dental profession, after graduating from Northwestern University Dental School in 1918.

W. J. Johnson

Dr. Johnson practiced in Bisbee for 11 years before moving to Phoenix, where he still maintains his office. He was on the Arizona State Board of Dental Examiners for three years, two of which he was secretary. It was during this time that he became interested in state laws governing dentistry, and it is mainly due to his efforts that Arizona enjoys such high standards of ethics. Dr. Johnson was instrumental in the passage of the state dental law and for all the amendments from 1935 to the present date, having served continuously as permanent chairman of the state legislative committee.

The Arizona State Dental Society feels that while a number of men in their state have been outstanding in dental research, a fact of which all Arizona dentists are proud, they owe their respect and appreciation to Dr. Johnson for the privilege of practicing their profession in an exceptionally ethical state.

Dr. Johnson was president of his local society in 1932 and was elected to the presidency of the state society in 1933. He served on the A.D.A.'s 13th district committee of dental economics from 1942 to 1945. He is a member of two fraternities, Phi Delta Theta and Xi Psi Phi.

ARKANSAS

John D. Jordan, a native of Arkansas, received his elementary schooling in that state, attended Ouachita College and earned his D.D.S. degree from Washington University School of Dentistry in 1907. He has practiced general dentistry continuously in Little Rock since that year.

Dr. Jordan was and is exceptionally active both in organized dentistry and civic affairs. He served as president of the Central District Dental Society for

J. D. Jordan

three terms, and was the first man elected to the Arkansas State Board of Dental Examiners from that district. In 1925, he was elected president of the Tri-State Dental Association (Ark., Miss. and

Tenn.). He was the first Arkansas dentist to be elected to an A.D.A. office, that of vice-president in 1928, and was president of the Arkansas State Dental Association in 1931. Dr. Jordan served as a civilian member on dental boards during both world wars.

Dr. Jordan is a life member of the American Dental Association, a Fellow of the American College of Dentists, Omicron Kappa Upsilon and an associate member of the Chicago Dental Society. He has served on the Little Rock city council for 12 years, temporarily acting as mayor on several occasions. He is past president and still a member of the Board of Pulaski County Tuberculosis Association. Dr. Jordan's state society feels that he is a just choice as their outstanding dentist because of his help and cooperation in the interests of the public and his fellow practitioners.

ARMY

Col. Robert T. Oliver served with the Field Artillery of the Indiana National Guard, during the Spanish-American War, and was impressed with the need for a dental service in the Army. He became a strong supporter of the Act of Congress, approved February 2, 1901, which established the Army Dental Corps.

The Administration recognized his leadership and appointed him Examining and Supervising Dental Surgeon, U. S. Army, on February 11, 1901, as a board member to examine the first candidates for the dental service.

Colonel Oliver was born in Indiana in 1868 and received his degree in dentistry from the Indiana Dental College in 1888 where he was given a professorship in oral surgery, continuing in the teaching of the subject until he began his military service.

Colonel Oliver served in the Philippine Islands and in the Mexican Punitive Expedition. Early in World War I, General Pershing ordered Colonel Oliver to France as Chief Dental Surgeon of the American Expeditionary Forces. For outstanding service, he was awarded the Distinguished Service Medal, the Legion of Honor and the French Double Palm d'Academie. Following the war, he was made chief of the Dental Division, Office of the Surgeon General, where he reorganized the dental service for the peacetime army.

Col. R. T. Oliver

Colonel Oliver was elected president of the American Dental Association in 1931. He gained an enviable reputation as an organizer and administrator in organized dentistry as well as in the Army's dental service. Colonel Oliver passed away in July, 1937.

CALIFORNIA

Arthur Roscoe McDowell was graduated from the School of Dentistry, College of Physicians and Surgeons, San Francisco, in 1917, and immediately entered the Army Dental Corps. In 1921 he was appointed junior dean of the dental school and was made dean in 1923, a position he occupied for the remainder of his life.

Soon after World War I the field of dentistry and dental education was reorganized under the leadership of William J. Gies. A few years later Dr. Mc-

A. R. McDowell

Dowell, as dean of his school and a capable administrator during this reorganization, succeeded in keeping the institution among the foremost dental schools in the nation. Even though he did not live to witness the present high standards of dental education, his influence in the field is still apparent.

Dr. McDowell was a member of the American Dental Association, the A.D.A. constituent and component societies, the American Association of Dental Schools, National Board of Dental Examiners, International Association for Dental Research, American College of Dentists and many others. Other than his work with the school, he served his profession through committees of the organizations. He served as president of the American Association of Dental Schools in 1935 and 1936 and held honorary memberships in many professional organizations, including several state dental associations.

SOUTHERN CALIFORNIA

Milus M. House of Whittier, Calif., organized numerous study club courses of great value to dentists of Southern California and to hundreds of dentists throughout the United States. He erected a building designed especially for study club meetings in 1928, and since that time he has given postgraduate courses to approximately 500 dentists who studied diagnosis, design and laboratory procedures of partial and full dentures.

Dr. House has written numerous scientific articles and books including "Form and Color Harmony," "Diagnostic Charts," "A Fundamental Classification of Natural Teeth" and, in association with Dr. Jack Loop, "Tooth Form and Color Harmony." In the latter study, more than 5,500 teeth were used and measured for form. As a result of this work, he designed an articulator, three-dimensional and fully adjustable, incorporating the rotary occlusal grinder.

Dr. House has contributed greatly to the building and maintenance of high standards of dental service, not only in Southern California but in the profession as a whole. He has presented countless clinics on various phases of dentistry before the American Dental Association,

M. M. House

the Pacific Coast Society of Prosthodontists and various state societies. A man of impeccable character and a great scientific mind, he has inspired hundreds of dentists to render a superior service to the profession and to the public.

CANAL ZONE

William Henry Grant was born in Petersburg, Ky., in 1889, and attended the Louisville College of Dentistry at Central University of Kentucky. He received his D.D.S. degree in 1917 and moved to the Canal Zone to begin a practice which is now in its 33rd year.

During the years of World Wars I and II, dentistry in the Canal Zone experienced chaotic conditions owing to the tremendous influx of both military and civilian personnel. This placed a heavy

W. H. Grant

burden on the already overtaxed dental staff, and the only solution to the problem was found in longer hours and more work. The service rendered by Dr. Grant and his colleagues during these trying periods is a gratifying tribute to the entire profession.

Dr. Grant takes a keen interest in providing dental services for charitable organizations in the Republic of Panama, and his work for the Bella Vista Orphanage is particularly noteworthy. He is a charter and honorary member of the Panama Dental Society and also has been a member of the Panama Rotary Club since its inception. His work and leadership in Panama dentistry have made him an outstanding and honored figure in the profession.

Having cared for the dental health of Canal Zone personnel for 33 years, Dr. Grant's sincerest desire is to serve an additional 33 years.

COLORADO

Henry Forest Hoffman was a member of the House of Delegates of the National Dental Association in 1911, when that body considered for the first time the reorganization of the association. Since then he has become a distinguished figure in organized dentistry and in public health work.

Dr. Hoffman was born in Bellaire, Ohio, and early in life moved with his family to Leavenworth, Kan., then to Kansas City, Mo. In 1893 he began the study of dentistry in the Vermont office of an uncle, returning, in 1894, to enter the dental office of C. K. Raber in Junction City, Kan. In 1898 he was graduated from the Colorado College of Dental Surgery with his D.D.S. degree, and continued in general practice until 1913 when he restricted his work to orthodontics, in which he is still actively engaged.

Dr. Hoffman is a life member of the American Dental Association, the Colorado State Dental Association and the Denver Dental Association. He has served as president, vice-president and secretary of the Colorado State Dental Association, and on many standing and special committees of the city and state associations. He is a Fellow of the American College of Dentists, a member of the American Association of Orthodontists, the

H. F. Hoffman

Rocky Mountain Society of Orthodontists and the Pacific Coast Society of Orthodontists.

As a pioneer in public health service, Dr. Hoffman was one of the incorporators of the Denver Public Health Council in 1925, and has been a member continuously, representing the Denver Dental Association.

CONNECTICUT

Alfred C. Fones of Bridgeport, Conn., enrolled and directed the training of the first class of dental hygienists ever graduated in the United States.

Dr. Fones believed oral hygiene to be a fundamental part of dental health, and demonstrated its benefits on a community-wide scale. Over a period of years, thousands of communities in America adopted the principles and practices established by him.

The son of a dentist, Civilion Fones, he followed in his father's footsteps even to becoming president of the Connecticut State Dental Association. He graduated from the New York College of Dentistry in 1890, at the age of 21, and began practice in his father's office.

He was a founder of the Junior College of Connecticut (now the University of Bridgeport) and served as chairman of its board of trustees until his death on March 15, 1938. Dr. Fones received many

A. C. Fones

distinguished medals during his lifetime, including the William Jarvie Fellowship Medal.

As a pioneer in developing a new outlook on dental health, Dr. Fones lived to see his principles materialize in almost every state and in Hawaii. Special schools for hygienists have been established, and dental hygienists are licensed in many states, a procedure he started in Connecticut in 1914.

DELAWARE

Philip A. Traynor of Wilmington, Del., has served society both as a dentist and national legislator. During the first of his two terms in Congress, 1940 and

P. A. Traynor

1944, he introduced legislation which abolished mail order dentistry. He also contributed to the passage of legislation which advanced the rank of naval dental officers. In the 79th Congress he was author of the bill creating the bridge over the Delaware River from Pigeon Point, Del., to Deepwater Point, N. J.

Dr. Traynor graduated from the University of Pennsylvania Dental School in 1905. He is a Fellow of the American College of Dentists, a member of the Delaware State Dental Society and the American Dental Association. He has been a member of the Delaware State Board of Dental Examiners for 32 years and was elected delegate to the A.D.A. annual meetings for 16 years.

During World War I, Dr. Traynor was appointed chief of the dental clinic to rehabilitate the mouths of draftees otherwise not acceptable. Through his efforts and direction, 6,200 men were qualified for service. He has probably done more charity work, individually and in clinics, than any other dentist in the state. He is the oldest regular attending member at the state society meetings, keeping pace with late developments in

organized dentistry and research, adding to the knowledge gained in his 45 years of practice.

DISTRICT OF COLUMBIA

C. Willard Camalier was born in Washington, D. C., March 6, 1887. He received his D.D.S. degree from George Washington University in 1912 and entered the general practice of dentistry in 1918.

Throughout his professional career he has contributed generously to both the profession and society. In addition to serving as secretary and president of the National Capital Dental Society, and as vice-president and president of the Columbia Dental Society, he served on several committees of those organizations. He was secretary-treasurer of the District of Columbia Board of Dental Examiners for 14 years and served one year as president of the American Association of Dental Examiners.

During World War I he was secretary of the Board of Commissioners of the District of Columbia and chairman of the Committee on Registrars for the

C. Willard Camalier

District. During World War II he was chairman of the American Dental Association's Preparedness Committee, National Defense Committee and War Service Committee. He was a member of the National Board of Procurement and Assignment and chairman of the Advisory Committee to Selective Service.

Dr. Camalier was vice-president of the A.D.A. in 1928, a member of the Board of Trustees for four years and president of the Association in 1937-38. For the past several years he has served as assistant secretary of the Association in charge of its Washington, D. C., office. For over three decades of the past half century he has exhibited leadership in dentistry for children, dental health education and dental legislation. Members of the Columbia Dental Society are privileged to be represented by Dr. Camalier in the MID-CENTURY ISSUE of THE JOURNAL.

FLORIDA

Gordon Belden Tison was born at Providence, Bradford County, Fla., a second generation Floridian. He received

G. B. Tison

his primary education at public schools and East Florida Seminary at Gainesville. After graduating from Smith's Business College, Lexington, Ky., he matriculated at Baltimore College of Dental Surgery from which he received his D.D.S. degree in 1897. He practiced in New York City for four years after graduation, and returned to Florida, opening an office in Gainesville where he continues to practice.

As a member of the Florida State

Dental Society, he has been an indefatigable worker for dentistry. He is a past president of the Alachua County, Central District and Florida State societies and has served in many other offices and on many committees. He is a life member and Honorable Fellow of the Florida State Dental Society, a life member of the American Dental Association and a Fellow of the American College of Dentists.

Dr. Tison has demonstrated the amalgam inlay technic before the American Dental Association, and societies in Florida, Georgia, Mississippi, Alabama, North Carolina, Pennsylvania and Cuba. While giving so generously of his time to dentistry he has found time for important civic service, having served as mayor of Gainesville and in other official posts in city affairs.

Dr. Tison has exerted a remarkably fine influence upon dentistry and upon dentists. The Florida State Dental Society has lauded him as being a credit to the profession in his state and country.

GEORGIA

Thomas Philip Hinman was born in Stratford, Canada, on March 4, 1870, and in 1871 moved with his parents to Knoxville, Tenn. and to Atlanta, Ga., in 1879. In this city Dr. Hinman spent the greater portion of his life, always regarding himself as a loyal Georgian.

In 1889 he matriculated in the Dental Department of the Southern Medical College (since merged with the Atlanta Dental College) and was graduated with a D.D.S. degree in 1891. He practiced for a year in Atlanta and accepted a professorship in oral surgery at his alma mater, continuing in this capacity during his lifetime. He also served as dean of the Atlanta Dental College and later of the Atlanta-Southern Dental College.

Dr. Hinman served as president of the Southern Branch of the National Dental Association in 1901. He was also a past president of the Georgia State Dental Society and of his own Fifth District Dental Society. He was elected president

T. P. Hinman

of the N.D.A. for the term 1915-16. He was one of the founders of the American College of Dentists, of which body he was a Fellow. In June, 1924, the University of Georgia conferred upon him the degree of Doctor of Science.

As a teacher, dentist and citizen, Dr. Hinman commanded confidence and regard, and was keenly sympathetic with the restless search after truth. He died on March 19, 1931, a strong personality who had inspired all who came in contact with him.

IDAHO

Hugh B. Colver has been called a "dentist's dentist" by his colleagues in Idaho. As a youthful dentist in 1919, he helped create and organize the Idaho State Dental Association, and whatever the association has done and is doing in the improvement of Idaho's standards of dental practice, it is synonymous with Dr. Colver.

He is one of Boise's outstanding civic leaders, devoting his life to the improvement of his city, its schools and the status of his profession on a statewide basis. Dr. Colver served seven years as secretary of the Idaho State Dental Association and was elected to the presidency in 1931. He

has been chairman of the legislative committee since the association was formed. In the latter capacity he initiated and helped pass the present Idaho dental law and subsequent amendments, including the licensing of dental hygienists by the 1949 Idaho legislature.

As a youth, Dr. Colver moved with his family from Modale, Iowa, to Idaho Falls. He graduated from the local high school in 1909, one of a class of nine. While still in high school he became interested in dentistry, and did laboratory and office work for the late B. M. Brookfield. In 1913 he received his D.D.S. from the University of Iowa and returned to

H. B. Colver

Boise to start practice. Since that time he has become one of the foremost figures in Idaho dentistry, always acting to better the status of and the conditions for practice of the profession.

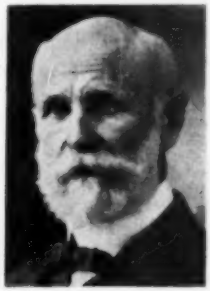
ILLINOIS

Greene Vardiman Black has been selected for honor from among the many great dentists of Illinois because he was proficient in so many dental as well as lay fields. He was student, teacher, writer and inventor.

Dr. Black was born August 3, 1839, and started his professional career by studying medicine under his older brother; then he spent a year in the dental office of Dr. J. C. Speer, his preceptor, at Mount Sterling, Ill. These years constitute his only formal professional training and, in view of his later greatness, add to his stature. He taught himself chemistry and through persistent work with the microscope, in a time when very little was known of micro-organisims, became one of the best histologists of his day.

His first dental teaching was done in the Missouri Dental College, then in the dental department of the University of Iowa and next at the Chicago College of Dental Surgery. While at this last school he taught C. N. Johnson, who later became as famous as the teacher. Dr. Johnson said of him, "I have never known a man who was so well-informed along so many lines as he, or who could so perfectly impart his information to others.

In 1891, with Drs. Gilmer, Noyes, Swain, Cushing and Ames he helped organize Northwestern University Dental School. From then on he devoted full time to teaching and research out of which came his work on amalgam, the physical character of teeth, dental calculus, studies in caries and his system of cavity preparation still in use.



G. V. Black

He is the designer of many precision instruments and has left such a bulk of writings that one wonders when this great man slept. These articles range from "Gold Foil" to "Out Sailing."

Dr. Black passed away August 31, 1915. Although there have been many

great men in the dental history of Illinois in the past half century, certainly none have contributed more of a lasting nature to our profession than Greene Vardiman Black.

INDIANA

Albert R. Ross attained B.S. and M.S. degrees from Purdue University, before he entered dental school to study his chosen profession. This undoubtedly had considerable bearing on his later proficiency as an administrator in the Indiana State Dental Association.

Dr. Ross graduated from Pennsylvania College of Dental Surgery in 1903, and returned to his home town of Lafayette to practice. In 1905 he became a member of the Indiana State Dental Association and the American Dental Association. At the annual session of his state association that year, Dr. Ross was appointed by the president to fill a vacancy on the Board of Trustees. For the next one-third century, his name appeared on the record of each annual meeting as a member of a committee, as a clinician, as an essayist or as one of the principal officers.

A. R. Ross

He served the I.S.D.A. as secretary, president-elect and president. During his tenures of office, he had a major part in constitutional revisions and in the enactment of amendments to laws governing dental practice. Dr. Ross was for many years a member of the House of Delegates of the A.D.A., and in 1934 was elected a member of the A.D.A. Board of Trustees to represent the Seventh District. He had served one year of his second three year term at the time of his death.

Dr. Ross will be remembered by his Indiana colleagues as "a diligent and faithful servant who became a leader and master whom it was a pleasure to follow and serve."

IOWA

Roscoe H. Volland holds a degree in medicine as well as a degree in dentistry, but it is toward dentistry that his devotion and knowledge are directed as a teacher, lecturer, practitioner and officer in dental associations.

R. H. Volland

Dr. Volland graduated from the Iowa State Teachers College in 1899, and went on to study dentistry at the state university. He received his dental degree in 1902 and studied for three more years to earn the Doctor of Medicine degree from the University of Iowa. In 1924 the honorary degree of Doctor of Science was conferred upon him by Northwestern University. He was a faculty member at Iowa's dental school for 21 years, and for 21 more years was Professor of Clinical Dentistry at Northwestern. He retired from teaching in 1944.

Dr. Volland was president of the Iowa State Dental Society in 1911, president

of the American Dental Association in 1928 and served as treasurer of the Association from 1928 to 1948. He is a charter member of the American College of Dentists (president in 1929), a life member of the American Dental Society of Europe, a life member of the International Association of Dental Research and a member of Psi Omega dental fraternity.

Because of his devotion to his profession, the Iowa State Dental Society is proud to present Roscoe H. Volland as the outstanding figure in Iowa dentistry during the past half century.

KANSAS

Clifford S. Kile graduated from the Kansas City Dental College in 1913, and since that time has made many contributions in several branches of dentistry which have been of great benefit to his fellow practitioners throughout the world.

Dr. Kile developed one of the first interchangeable porcelain pontic teeth for bridges. He invented the Kile self-cooling mixing slab for dental cements, and an

C. S. Kile

instrument for measuring and dispensing dental cement liquid. He developed a three dimensional Gothic arch tracing instrument which in itself becomes the articulator. His present work on functional full denture impressions and materials is increasingly accepted by outstanding men in the field of prosthodontia.

Dr. Kile was born in 1891 at Canton, Kan., and after earning his degree practiced briefly in Ellinwood and Newton before entering the Army. Upon his discharge in 1919, he started practice in Hutchinson, where he is today. He has held all offices in local and district societies, and is a member of the Kansas State Dental Society, the American Dental Association, the American Denture Society and an associate member of the Chicago Dental Society. Dr. Kile developed and was supervisor of the dental education program in the Hutchinson public schools from 1929 to 1944. It was from this program that the Kansas state plan was developed.

KENTUCKY

William Marcus Randall of Louisville, Ky., is prominent for his outstanding work as a teacher of dentistry, with the rank of professor for half a century, and as an active member of state and national dental societies.

Dr. Randall has given many clinics,

W. M. Randall

papers and illustrated lectures before local and national dental organizations. He has given instruction in dental anatomy and pathology, full and partial denture prosthesis, physics, ceramics, orthodontics and operative dentistry. His principal activity, interest and study have been in the

field of complete denture prosthesis.

Since 1900 Dr. Randall has been an active member of the Louisville District Dental Society, the Kentucky State Dental Association and the American Dental Association. He is a 52-year member of Psi Omega dental fraternity, a Fellow of the American College of Dentists and a member of the International Society of Dental Research. He was editor of the Kentucky State Dental Association Bulletin from 1908 to 1920, and is past president of the association. He has been active in the Full Denture Prosthesis Section of the A.D.A., serving as vice-chairman and chairman.

As a youth, Dr. Randall taught in a one room schoolhouse before studying dentistry at the Hospital College of Medicine, Central University. He received his D.D.S. degree in 1900 and accepted a position on the faculty. He has been serving in that capacity since that time.

LOUISIANA

C. Edmund Kells was born in New Orleans on October 21, 1856, the son of Charles E. Kells, a practicing dentist. Through association with his father, he became interested in dentistry and entered his father's office as a student in 1874. Thus he began a distinguished career as a dentist, writer, lecturer and inventor.

While studying with his father, Dr. Kells attended lectures at the New Orleans College and in 1876 he entered the New York Dental College to sudy for his D.D.S. degree. Immediately after his graduation in 1878, he returned to New Orleans and established his practice in association with his father. From the beginning of his career, Dr. Kells was active in dental society affairs and was a lifelong member of the First and Second District Societies of Louisiana, the Louisiana State Dental Society and the American Dental Association. He was a Fellow of the Dental Society of New York, a Fellow of the American College of Dentists and a life member of the Delta Sigma Delta fraternity.

Throughout his career, Dr. Kells maintained an active interest in all that pertained to dentistry. Of an inventive mind, he did pioneer work in the use of electricity in dentistry, and perfected dental stereoscopic pictures and the wire-roentgen ray technic. He was a prolific writer and contributed more than 200 articles to the literature of dentistry; he wrote two books on dentistry and was a contributor to other authors' textbooks.

C. E. Kells

Dr. Kells died on May 7, 1928, and will always be regarded as a man of great mental stature who had the interests of his profession at heart in whatever he accomplished.

MAINE

James Leon Williams is best known for his outstanding work on face form and type as applied to tooth form. His study and work with tooth form revolutionized the manufacture of artificial teeth and his influence in this field is still apparent.

Dr. Williams was born in Concord, Me., in 1852, the eldest of eight children. His early years were spent on his father's farm and since the opportunity for for-

mal education was rather limited, he learned by judicious home study and extensive reading. About 1869 he apprenticed himself to E. J. Roberts, a dentist in North Vassalboro, Me. Dr. Roberts was a skilled and thorough teacher and within two years Dr. Williams was ready to enter practice in the town of his training. In 1883 he earned his D.D.S. degree from the Baltimore College of Dental Surgery. In 1887 he received an L.D.S. degree from the Royal College of Dentistry in Dublin.

J. L. Williams

Dr. Williams practiced for a time in Vassalboro, Augusta and Lewiston, Me., New York, New Haven, Conn., and Philadelphia. At this point in his career his health failed, and he sailed for England where he carried on a successful practice for many years. Upon his return to America, he divided his time between New York and his family home in Maine.

Dr. Williams contributed greatly to the scientific development of dental histology and corrected many of the outstanding fallacies of the day. Some of his debates and discussions were with such eminent men as Garretson, Heitzman and Bodecker.

MARYLAND

J. Ben Robinson has participated in all phases of local and national health planning for many years, and has taken an aggressive part in promoting standards and practices in dental education and research in the United States. The dentists of Maryland are proud to name him as their outstanding dentist of the past half century.

Dr. Robinson's leadership is demonstrated by his having been president of the Maryland State Dental Association, president of the American Association of Dental Schools, president of the A.D.A. and president of the American College of Dentists. He has served for many years as a member of the A.D.A. Council on Dental Education and as its chairman many times.

J. B. Robinson

Before entering the Dental School, University of Maryland in 1911, Dr. Robinson taught in public schools in his native state of West Virginia. He received his D.D.S. degree with *magna cum laude* honors in 1914, and remained at the dental school to teach for 10 years. He was made dean in 1924, a position he still holds. During World War II Dr. Robinson was one of nine persons selected by Secretary Stimson to investigate the organizational plan and effectiveness of the Army Medical Department.

Dr. Robinson is the recipient of a number of awards, all for distinguished services in the fields of dental education and organization. He is a member of five fraternities, has written 75 articles on dental health and education and one book on dentistry.

MASSACHUSETTS

Percy R. Howe received virtually every honor which was within the province of dentistry to bestow. He was the only living person to receive the highest award of the American Dental Association, the "Award of Merit and Achievement," which had been given only twice before, and then posthumously.

During his life span of 86 years, Dr. Howe made vital contributions to dental practice, research and the training of dental students. He received his D.D.S. degree from Philadelphia Dental College in 1890 and practiced for eight years in Lewiston, Me., and 17 years in Boston where he accepted an appointment as research chief of the Forsyth Dental Infirmary in 1915. Twelve years later he became director of the infirmary and continued in this post until his death, February 28, 1950.

Dr. Howe was a pioneer in research in vitamin and mineral metabolism, and originated the silver reduction treatment of infected dentin and septic roots. He was the author or co-author of over 140 papers and lectured extensively in the United States and Canada.

As director of Forsyth, Dr. Howe was a far-seeing and practical administrator. Standards for the selection of interns were raised, a distinctive lecture course was instituted and the clinics were converted into teaching centers. Under his leadership, Forsyth has had an international influence on dental concepts and practices.

Dr. Howe was president of the A.D.A. in 1929, and was a member of the American Academy of Arts and Sciences, Federation Dentaire Internationale, New England Pediatric Society and numerous other professional and fraternal organizations.

P. R. Howe

MICHIGAN

Chalmers J. Lyons was graduated from the School of Dentistry, University of Michigan, in 1898, returning to the school in 1907 to become an instructor in clinical dentistry. He was made a nonresident lecturer in 1910 and was awarded the degree of D.D.Sc. in 1911. He was appointed instructor of oral surgery in 1913 and in 1915 was promoted to the full professorship in that subject, also being named consulting dental surgeon to the university hospital. This was the beginning of his pioneering work which resulted in a greater recognition and acceptance of oral surgery as a part of hospital practice. Dr. Lyons took special instruction from Truman Brophy in cleft lip and cleft palate surgery and in 1917 with Cyremus Darling founded the Department of Oral Surgery in the University of Michigan Hospital. Thus began the development of one of

C. J. Lyons

the world's earliest and largest clinics devoted to cleft lip and cleft palate surgery. The excellent results in oral surgery brought rapid growth to the clinic and surgeons from all parts of the world came to observe his methods. He began the training of a group of men who have become outstanding in oral surgery over the entire country. In 1927 these men founded the Chalmers Lyons Academy of Oral Surgery in honor of their chief and continue to meet regularly.

Dr. Lyons was a frequent contributor to dental and medical literature and was always active in professional organizations. He was President of the American Association of Oral and Plastic Surgeons, the Michigan State Dental Society and a member of many other honor societies. He was loved and respected for his unselfish accomplishments and his great contributions to humanity.

MINNESOTA

Alfred Owre was one of the most challenging and controversial figures in the history of dentistry because of his basic theory that dentistry is properly a specialty of medicine, and that dentists should be dental specialists in the medical profession. Because of his beliefs, he is given much credit in raising the status of dental education from that of mere technical training to a truly scientific level.

From 1905 to 1927 Dr. Owre served as dean of the College of Dentistry at the University of Minnesota, and from 1927 to 1933 he was dean of Columbia University's School of Dentistry. While at Columbia, Dr. Owre became the center of controversy on how the benefits of dental care could be extended to a far greater number of people under our economic system. Dr. Owre suggested the education of dentists on two levels: highly trained people who would be dental specialists in medicine, and persons with less education and training who would be essentially dental technicians and who would work under the supervision of specialists.

He also stood for the extension of dental benefits through clinic services, at low cost or none for those who cannot obtain good dental service at their own expense. In his later years he looked with favor on the organization and practice of medicine and dentistry in European countries where clinic and panel practice were commonly accepted.

While Dr. Owre's theory has never been supported by a majority, it has served as a stimulus for many reforms in dental education.

MISSISSIPPI

William R. Wright of Jackson, Miss., is, in the opinion of his associates, the man who has made the most outstanding contribution to the progress of dentistry in Mississippi during the past 50 years. Dr. Wright was chosen because of his public service and organization activities.

A native of Tate County, Miss., Dr. Wright's early education was acquired in

A. Owre

W. R. Wright

the public schools. He graduated from Atlanta Dental College in 1897, as president of his class, and in 1898 located in Jackson, where he continues to practice.

Dr. Wright has served as secretary and president of the Mississippi Dental Association, and in 1921 he was elected first vice-president of the American Dental Association, later serving as a trustee. He was appointed chairman of the A.D.A. Council on Mouth Hygiene and Public Instruction. In 1923, at Cleveland, Ohio, he called an organization meeting of dental hygienists, which resulted in what is now known as the American Dental Hygienists' Association.

Dr. Wright holds life membership in several professional organizations, and is a member of Psi Omega fraternity and Omicron Kappa Upsilon honorary dental fraternity. He was the first dentist to be appointed a member of the Mississippi State Board of Health and is now serving his 25th consecutive year on that board.

MONTANA

O. A. Kenck of Augusta, Mont., was one of the pioneers in "mobile dental units" early in the century. With portable dental equipment mounted on a wagon, he made periodic visits to isolated ranches and small towns in the Helena trade area, bringing them excellent dentistry.

Dr. Kenck was graduated from the Chicago College of Dental Surgery in 1898, and started practice in Helena, Mont., that same year. In 1900 he moved to Augusta, then a small inland cow town some 50 miles from the nearest medical aid. For long periods this remote community was snowbound, mudbound and completely isolated. During these periods of inclement weather, emergencies arose and Dr. Kenck found himself acting as an obstetrician, setting fractures, dressing wounds and lending an ear to various intimate troubles of his patients.

During these times death was certain to occur in the area, and Dr. Kenck acted as undertaker, embalmer and funeral conductor. All this was done without charge, and only through his natural urge to serve humanity.

Dr. Kenck has served as president of the Montana State Dental Association. He has been a member of his local school board for 40 consecutive years. Today he practices modern dentistry in an up to date office and continues to do more than is required of him.

NAVY

Emory A. Bryant, the first appointee in the Naval Dental Corps, was commissioned October 23, 1912, under the provision of an Act of Congress, and deserves great credit for his part in the growth of naval dentistry.

Preliminary to and following his appointment as a dental officer, Dr. Bryant was closely associated with Williams Donnally and William N. Cogan, and all

O. A. Kenck

E. A. Bryant

deserve recognition for their contributions to the Naval Dental Corps. Dr. Donnally represented the Committee on Army and Navy Dental Legislation of the National Dental Association, and Dr. Cogan was then dean of the School of Dentistry, Georgetown University. The second appointment in the Naval Dental Corps went to Dr. Cogan on October 24, 1912.

Dr. Bryant was born in Kalamazoo, Mich., in 1863. He was graduated from Baltimore College of Dentistry in 1886 and practiced in Washington, D.C., for many years. Later, he earned his law degree from George Washington School of Law and for several years engaged in the practice of patent law in Washington.

Dr. Bryant invented many dental devices, notably maxillary fracture and bridge repair appliances. On March 15, 1929, he was retired and died at his home in Washington, D. C., on November 25, 1935.

NEBRASKA

Mark E. Vance was one of three dentists in his family who all served as president of the Nebraska State Dental Association during their professional careers. He served as president in 1908, while his father, D. A. Vance, preceded him in the office in 1882. His uncle, W. W. Vance, was president of the association in 1891.

M. E. Vance

Dr. Vance received his degree in dentistry from Northwestern University in 1900 and located in Lincoln, Neb. He soon associated himself with organized dentistry and served as secretary-treasurer of the state association from 1905 to 1907, and as recording secretary in 1906. He was one of the Nebraska delegates to the American Dental Association for many years, and served as vice-president in 1917-1918.

Dr. Vance was a member of the faculty of the College of Dentistry, University of Nebraska, teaching dental ethics and economics. Because of his proficiency in all phases of dentistry and because of his inspiring personality, Dr. Vance instilled high ideals in dental students and graduates.

He was one of the organizers of Beta Beta chapter of Delta Sigma Delta at the University of Nebraska, and was Supreme Grand Master of the fraternity during the period 1924-1926, during which time he visited and inspected all active college chapters in the United States.

Dr. Vance passed away in Lincoln, in 1927.

NEVADA

George C. Steinmiller was born in Sacramento, Calif., but moved to the neighboring state of Nevada after earning his D.D.S. degree from the University of California in 1905. He opened his first office in Reno in 1906 and is still practicing there as one of the most prominent figures not only in Nevada dentistry but in civic and fraternal affairs as well.

Upon graduation from dental school in 1905, Dr. Steinmiller entered Sacramento Hospital for a year's internship. During the great 1906 earthquake and fire in San Francisco, he was put in charge of the Sacramento Hospital Corps to help aid the stricken city.

Dr. Steinmiller has been a member of

G. C. Steinmiller

A. J. Sawyer

the Nevada State Board of Dental Examiners since 1914, served as its president in 1916, and has been the board's secretary since 1930. He is a state delegate to the American Dental Association, a past president of the Nevada State Dental Association and of the Washoe County Dental Society. Dr. Steinmiller is also a state delegate of the American Association of Dental Examiners and holds the rank of major in the U. S. Public Health Service.

He is exceptionally active in lodge work and in civic clubs, fraternities and the Pacific Coast Dental Conference, holding membership in a total of 15 such organizations.

NEW HAMPSHIRE

Andrew J. Sawyer was among the first to do cast gold inlays, and porcelain jacket crowns and inlays, but he is remembered best in New Hampshire for his ability as a clinician and a teacher, an inspiration for younger dentists.

Dr. Sawyer was born at Russell Hill, Pa., in 1859, one of a family of eight children. He worked his way through the old Pennsylvania College of Dental Surgery and graduated in 1882. He opened an office in White Haven, Pa., but soon moved to Newmarket, N. H., where he practiced for a year. In 1890 he located in Manchester, N. H., and continued practicing there until his death in 1930.

Dr. Sawyer was president of the New Hampshire Dental Society in 1898 and president of the New England Dental Society in 1912. He was secretary of his state dental board for 12 years, a member of the American Academy of Dental Science and an honorary member of the Vermont Dental Society. His fraternal affiliations included membership in the Knight Templars and other Masonic orders.

Because of his great storehouse of knowledge, Dr. Sawyer's wise counsel was sought by youthful members of the profession. They found him always ready to stop work and discuss their problems with them. His kindly way of conveying his ideas to others endeared him to all those with whom he came in contact. Although it has been 20 years since he passed away, Dr. Sawyer is remembered by those who knew him as an outstanding dentist, an excellent teacher and a gentleman.

NEW JERSEY

Charles Frederick Harper, editor of the *Journal*, New Jersey State Dental Society since 1936, has been honored by the society as a man who exemplifies the true idealism of the dental profession. From the turn of the century to the present, as a kindly general practitioner, he has found time to leave an indelible impression of straight thinking which knows no compromise.

His stirring editorial, "Where's Elmer?" had nationwide distribution, and

C. F. Harper

as a crusader he has always been an intelligent and understanding one, ready to speak in defense of what he believes to be just and right for the profession. He is a determined opponent, therefore, of diluting the profession with so-called "new types of auxiliary personnel," because he feels that in every country where dentistry's professional unity has been divided, the results have always been chaos and black market dentistry. He has called the profession's attention to bureaucratically controlled public health services, double licensure and mass advertising with trade houses participating. He has taken up the cudgels in defense of the highest tenets of professional integrity.

Dr. Harper served as president of the Hudson County Dental Society in 1928 and was appointed editor of the *Hudson County Bulletin* in 1933, serving in that capacity until 1935. He is a Fellow in the American College of Dentists, a member of the Federation Dentaire Internationale and served as president of the American Association of Dental Editors in 1944.

NEW MEXICO

Howard R. Raper has been appropriately called the "Father of Radiodontia" by his colleagues in New Mexico, for it was he who established the first full time course on the subject at Indiana Dental College, opened the first office devoted exclusively to the specialty in Indianapolis, and wrote the first comprehensive text on the subject.

Dr. Raper was born in Chillicothe, Ohio, and moved to Indianapolis while still in high school. He received his dental degree from Indiana Dental College in 1906. After practicing in nearby locations for several years he returned to the dental school as an instructor where he remained for the next 10 years. It was during the latter part of his college connection that he took up radiography.

He was president of the Indianapolis Dental Society in 1916 and treasurer of the Radiological Society of North America the same year. Dr. Raper moved to Albuquerque, N. M., for his health in 1917, expecting to remain for a year, but decided to make it his permanent home.

H. R. Raper

His research has been limited mainly to roentgenographic diagnosis. Products of this research include the Raper Angle Meter and the Bitewing film packet. His literary research into the early history of anesthesia is reported in his book, *Man Against Pain,* a best seller among popular medical books and accepted as the definitive work on the discovery of anesthesia.

Dr. Raper is a member of local, national and international dental associations and is the recipient of many honors for his research. The dentists of New Mexico are privileged to have Dr. Raper represent them in the MID-CENTURY ISSUE of THE JOURNAL.

NEW YORK

Harvey J. Burkhart became interested in dentistry when he moved to Dansville, N. Y., to live with a brother who was a practicing dentist in that city, and went on to attain many of the highest honors in the dental profession.

Dr. Burkhart graduated from the Baltimore College of Dental Surgery in 1890 with first honors. For 25 years he practiced in Batavia, N. Y., where his special interest in preventive dentistry and orthodontics brought early recognition of his abilities and talents as a dental leader. Civic-wise, he was president of Batavia for four terms and was elected its first mayor when the city was incorporated in 1914. He moved to Rochester, N. Y., in 1916, and his many abilities attracted Mr. George Eastman, the philanthropist and humanitarian.

H. J. Burkhart

Mr. Eastman selected Dr. Burkhart as the first director of the Rochester Dental Dispensary, and the successful administration of this institution made him the logical choice for director and supervisor of Mr. Eastman's dental clinics in London, Brussels, Paris, Rome and Stockholm.

Dr. Burkhart's sudden death on September 22, 1946, caused dentistry to lose one of its most colorful figures. As a dentist, teacher, diplomat, public-spirited citizen and friend, he was honored and respected by all who knew him.

NORTH CAROLINA

Clyde E. Minges was born August 7, 1891 in Newton, N. C. Following his graduation from the School of Dentistry, University of Louisville, he entered general practice in Rocky Mount, N. C. where he has always taken an active interest in the social, civic and religious affairs of the community.

From the beginning of his professional career he has demonstrated leadership in all matters pertaining to the advancement of dentistry, with the result that he has been elected, without opposition, to every important office in the North Carolina Dental Society, serving as president in 1943-44. For two terms he was a member of the North Carolina Board of Dental Examiners and served as president of that body in 1936. He was a member of the House of Delegates of the American Dental Association for many years, a member of the Board of Trustees from the Fifth District for two terms and president of the Association in 1948-49.

In June, 1949, the University of Louisville conferred upon Dr. Minges an honorary LL.D. degree in recognition of his many contributions to his profession and to society. He is a member of the Delta Sigma Delta and Omicron Kappa Upsilon dental fraternities, American College of Dentists, International College of Dentists, Nash County Board of Health and served on the North Carolina Medical Care Commission. North Carolina

C. E. Minges

is privileged to be represented by Dr. Minges who has served the profession so ably during 30 of the past 50 years.

NORTH DAKOTA

Fred Rose of Cooperstown, N. D., has been selected by the North Dakota State Dental Association to represent its "Grand Old Men" of dentistry in this issue of THE JOURNAL, since he is considered to be a dental counterpart of the venerable "country doctor."

Dr. Rose was born in Ontario, Canada, in 1874 and was graduated from the Chicago College of Dental Surgery in 1896. After graduation he opened an office in

F. Rose

Fargo, N. D., and in 1899 moved to Cooperstown, N. D. where he is still in active practice. He was present at the charter meeting of the North Dakota State Dental Association in 1906 and served as its president in 1920-21. He has been a life member of his state association since 1939 and a life member of the American Dental Association since 1949. From 1913 to 1918 he served on the State Board of Dental Examiners and has held many civic and community offices.

Dr. Rose has presented papers and clinics in some branch of dentistry at almost every annual meeting of the state association. His standard of excellency in practice has never wavered as he has sought the new and perpetuated the good in the old. His life in dentistry should be a monumental beacon for younger members of the profession to follow as his creed is "service above self."

The North Dakota State Dental Association is proud to present Dr. Rose, who has so richly endowed the profession with a kindly, perpetual and everlasting inspiration.

OKLAHOMA

B. L. Shobe is known in Oklahoma as dentistry's "Paul Revere" because of his activities in organizing Oklahoma's scattered dentists during the early part of the century. He is credited with having toured the state in a horse and buggy organizing the districts that later became components of the state society, thus bringing order into the profession's activities.

Dr. Shobe was born in 1863, in Smith's Grove, Ky., and was a graduate of the Ohio Dental College. He began the practice of dentistry in 1881 at Wellington, Kan., then moved to Garden City, Kan. He later practiced in Bartlesville, Okla., and in 1913 moved to Tulsa where he practiced until his death in 1917.

As president of the Oklahoma State Dental Society in 1910, Dr. Shobe conceived the idea of the postgraduate plan of conducting a dental meeting. This was later called the "Oklahoma Plan" and was adopted by professional organizations all over the nation. Entire college facul-

B. L. Shobe

ties would attend these meetings and conduct a week of intensive study of dentistry.

The Shobe memorial plaque placed in the Medical and Dental Arts Building of Tulsa, bears his name and others of Oklahoma dentistry's immortal. The names on the plaque to date include Dr. Shobe's colleagues who aided him in organizing the state's dentists: Charles W. Day, Albert E. Bonnell, C. R. Lawrence, Charles Lincoln White and Arthur C. Seids.

OREGON

Herbert C. Miller studied dentistry in the Missouri Dental School in St. Louis and received his degree in 1885. Two

H. C. Miller

years later he graduated from the St. Louis Medical School with an M.D. degree and entered dental practice in Nebraska City, Neb. In 1891 he moved to Portland, Ore., and soon became associated with the Oregon College of Dentistry as a leader in pioneering the advances in dental education.

At the turn of the century, the Oregon College of Dentistry absorbed the Tacoma College of Dentistry and the North Pacific College of Oregon was founded. Dr. Miller became dean of the dental school in 1901 and recommended to state university authorities that a dental school be established in connection with the University of Oregon. No action was taken at that time, but in 1924 the dental school became a public trust directed by a board of trustees.

In 1918 Dr. Miller was elected president of the National Association of Dental Faculties. Because of his loyalty to dentistry and his active interest in local and state associations he was elected a trustee of the American Dental Association.

Dr. Miller's long dream of making the dental school a part of the university came true in 1945, just before his retirement. When he retired, Dr. Miller moved to Newport, Ore., where he supervised the building of an attractive home overlooking Yaquina Bay and the Pacific Ocean. On December 20, 1947, three days after moving into his new home, he died suddenly from a heart attack.

PENNSYLVANIA

Matthew H. Cryer was a mature man when he decided upon the study of dentistry and medicine, and at the age of 36 earned his dental degree from the Philadelphia Dental College, and was awarded his M.D. degree a year later from the University of Pennsylvania. He devoted the rest of his life to research in and the teaching of oral surgery and the perfection of operational instruments.

Dr. Cryer was the inventor of the surgical engine, an electrically-driven instrument for cutting bone, used by sur-

M. H. Cryer

geons for many years. He also devised the still popular universal upper and lower extraction forceps and the root elevators that bear his name.

Dr. Cryer was born at Manchester, England, in 1840, and came to this country with his family in 1851 to settle in Ohio. In 1861 he enlisted in the Sixth Ohio Volunteer Cavalry, and in 1865, as a major, he was present at Lee's surrender at Appomattox. Resuming his studies he began teaching immediately after earning his M.D. degree, joining the faculty of Philadelphia Dental College. In 1917 he retired because of age, but resumed his teaching duties until the war was over.

In 1900 Dr. Cryer initiated dental internships at Philadelphia (General) Hospital, which are believed to be the first of such internships in this country. Besides holding membership in both the A.D.A. and the A.M.A., Dr. Cryer was an active member of almost every important scientific and professional organization until his death in 1921.

PUERTO RICO

Jose Vicente, president of Colegio Cirujanos Dentistas de Puerto Rico, was born February 2, 1894, at San Juan, Puerto Rico. He graduated from the University of Pennsylvania in 1918 and the next year completed a course of postgraduate work.

He returned to San Juan and opened an office as a general practitioner. Since the beginning of his professional career he has been active in the affairs of organized dentistry. He served as treasurer of the now extinct Asociacion Dental during 1921, at which time he was elected president of the organization. He was reelected successively until 1942, having served in that capacity for 21 years.

When the Colegio Cirujanos Dentistas was organized in 1942, he became its first president and was reelected for a second term. In the last election of officers for the association, Dr. Vicente was elected once more to head the organization. He has been president of the F.O.L.A. chapter in Puerto Rico and is an honorary president of the C.C.D. de Puerto Rico.

Despite his busy schedule as a general practitioner in San Juan, Dr. Vicente retains the admiration and respect of his fellow practitioners by his untiring efforts to better his profession's standards, research and ethics. His popularity as an administrator is unanimous.

RHODE ISLAND

Charles Albert Brackett and his contributions to both dental and community circles were aptly summed up by the former president of Harvard University, Dr. Charles W. Eliot, who said: "Dr. Brackett's influence will give to coming generations an invaluable lesson on the immortal worth of character, gentle manners, unselfishness and public spirit."

A native of New Hampshire, Dr. Brackett rose to eminence at Newport, R. I., where for more than half a century he enjoyed a rich and varied career. He received his D.M.D. degree from Harvard Dental School, and was appointed to the staff as an instructor in dental therapeutics. He successively became Assistant Professor of the course, Professor of Dental Pathology and Therapeutics, Professor of Dental Pathology and finally Professor of Oral Pathology.

C. A. Brackett

Dr. Brackett was a member of the first Administrative Board of the Harvard Dental School, serving from 1899 to 1920. For the furtherance of dental education he donated to the school a sum in excess of $400,000. One of the organizers and the second president of the Rhode Island Dental Society, he was extremely active in dental organization, having been appointed to the state board of registration and serving as its president for nine years.

He gave freely of his time to the civic demands of Newport, his adopted city where he passed away on March 20, 1927.

SOUTH CAROLINA

Virgil Randolph Hawkins was perhaps the best manipulator of gold and silver alloy that the southern states have known. He was skilful in the technic and took great pride in every operation he performed, with the result that he reached such prominence as to be demanded for clinical demonstrations before national and state societies.

Dr. Hawkins was born in Union, S.C., in 1883 and graduated from the Southern Dental College (Emory University) in 1908. He practiced in his native town until his death in 1940. An unselfish servant of dentistry during his professional life, he occupied many official positions in the South Carolina State Dental Association, but because of his impaired hearing he declined the office of president tendered to him. He was a member of the South Carolina State Board of Dental Examiners from 1932 to 1937, and the present high professional standards of the state are largely the result of his untiring efforts.

The profession of South Carolina proudly acclaims Virgil Hawkins the most eminent dentist of their state during the first half of the twentieth century. They consider him an individual of great worth, possessing a laudable quality of leadership, one who set the example of not "do as I say," but "do as I do." He exemplified the ideal for future dentists.

SOUTH DAKOTA

Ernest W. Elman received his dental degree from the University of Iowa in 1910, started his practice in his home town of Sioux Falls, S. D., and immediately identified himself with organized dentistry. He invited his former operative dentistry professor, R. H. Volland, to the 1913 state meeting during the year that the National Dental Association was reorganized, and with Dr. Volland's advice and counsel the South Dakota Dental Society became an affiliate of the National Dental Association.

Dr. Elman is a past president of his state society, and at present is in his 33rd year as secretary. He has been a delegate or an alternate to American Dental Association annual meetings for 30 years, and has served on numerous committees.

V. R. Hawkins

E. W. Elman

He was vice-president of the A.D.A. in 1931.

During World War I, Dr. Elman was South Dakota director of the Preparedness League of American Dentists. He is a member of Omicron Kappa Upsilon honorary dental fraternity, various Masonic bodies, and is active in Y.M.C.A. work and in Methodist church affairs.

Dr. Elman was chosen by his state society as being its outstanding dentist during the past 50 years because of his pride in the profession and his enthusiasm for its continued growth and scientific progress. He has given his time and ability unselfishly to dentistry.

TENNESSEE

Llewellyn Garnet Noel is a name that stands out pre-eminently in Tennessee dentistry's hall of fame, but it is as the

L. G. Noel

founder of the Relief Fund of the American Dental Association that Dr. Noel's importance to the entire profession is emphasized.

Dr. Noel was born in Kentucky and moved to Nashville as a youth to study medicine at the University of Nashville. Shortly after earning his M.D. degree, he entered Philadelphia Dental College and was awarded his D.D.S. degree in 1872. He opened an office in Nashville and continued to practice dentistry there until his death in 1927.

Dr. Noel has been spoken of as having all the qualities of mind and character which go to make the ideal professional man. He was a member of the faculty of the University of Tennessee Dental School and later of the Dental Department of Vanderbilt University for over 50 years, influencing by his precepts and example the lives and careers of hundreds of young men.

Dr. Noel held many positions of honor and trust. He was president in 1903 of the National Dental Association, and served as president of the Southern Branch of the N.D.A., his state and district societies. Beside his brilliant professional aptitudes, Dr. Noel had gained a broad general culture in love of travel and the arts, literature and history. Former students will, however, remember him best for his high ideals and for his conviction that the dental degree imposes an obligation comparable to the Hippocratic oath.

TERRITORY OF HAWAII

John Morgan Whitney received his D.D.S. degree from the Pennsylvania College of Dental Surgery in 1868, and

J. M. Whitney

early in his practice he recognized the importance of good teeth in relation to physical well being. This was one of the prime reasons for Dr. Whitney's decision to study medicine; he was awarded his

M.D. degree from Starling Medical College, Columbus, Ohio, in 1874.

With degrees in dentistry and medicine, Dr. Whitney felt that he could best overcome the determined attitude of physicians who frowned upon the practice of dentists administering general anesthetic. It was to dentistry, however, that Dr. Whitney devoted his life.

He practiced dentistry briefly in Cleveland, and sailed for the Hawaiian Islands, where he had practiced immediately after graduation from dental school several years before. He remained in Hawaii for the remainder of his lifetime, following his profession until he passed away at the age of 92 on November 17, 1927.

Dr. Whitney was the first graduate dentist to practice in Honolulu, and when the dental practice act was passed in April, 1903, he was appointed to serve as the first president of the Board of Dental Examiners. He was issued license number one.

In addition to many religious activities, Dr. Whitney was prominent in early organized dentistry in Hawaii and on the mainland. He is remembered as a highly respected citizen and a humanitarian in his profession.

TEXAS

William Oliver Talbot was born February 2, 1873, in Scott County, Miss., and has enjoyed an enviable career both as dentist and civic servant.

Dr. Talbot first entered practice in Biloxi in 1895 where he remained until 1910. He then moved to Fort Worth, Texas, where he specialized in orthodontics and later in periodontia. His entire professional career has been devoted to the advancement of dentistry and the improvement of public welfare. He has been an indefatigable worker on most of the important committees of the Mississippi Dental Association and the Texas State Dental Society and has served as secretary and president of both organizations.

Among his many activities he has been a teacher, lecturer, writer, member of the Texas State Board of Dental Examiners and a member of the Board of Trustees of the American Dental Association. He was secretary of the Biloxi, Waynesboro and Cahaba Railroad Company, and alderman of Biloxi, where he initiated the first depository law for that city and revised the municipal chapter of the State Code of Mississippi.

He is a member of the American Academy of Periodontology, American College of Dentists, Masonic Lodge and the Ft. Worth Chamber of Commerce.

Few men could do more than Dr. Talbot to advance the cause of dentistry and to improve the profession's service to the public. The Texas Dental Society is privileged to have Dr. Talbot represent its members in this MID-CENTURY ISSUE of THE JOURNAL.

W. O. Talbot

U. S. PUBLIC HEALTH SERVICE

Clinton T. Messner was the first dentist to be commissioned in the Regular Corps of the U. S. Public Health Service. He received his commission in July, 1930, and was able to build a solid foundation for dentistry before his untimely death in 1936.

Dr. Messner was a graduate of the School of Dentistry, Indiana University, and opened his first office in 1908 at Oxford, Ind. In 1911 he went to Portland, Ore., and taught in the dental school for two years, returning to Oxford in 1913 to engage in private practice. He was called to active duty in the Army in 1917.

Dr. Messner entered the U. S. Public Health Service in 1919, and was placed in charge of the 9th District dental activities at St. Louis. In May of 1921 he was transferred to Washington, D. C., and placed in charge of the P.H.S. dental clinic at 7th and B Streets, Northwest. In June, 1924, he became chief of the Dental Service.

C. T. Messner

The establishment of public health dentistry as a part of the dental school curriculum was the result of Dr. Messner's encouragement. He was responsible for establishing the first chair of public health in the School of Dentistry at Indiana University. He lectured on many dental subjects at universities, postgraduate clinics, dental and medical society meetings.

Dr. Messner's ideals for dentistry, both within the Public Health Service and the profession at large, were of the highest. He was active in the ranks of organized dentistry and was interested in international dental health work. He was honorary president of the Association Dentaire Internationale in 1931.

UTAH

R. C. Dalgleish, a lifelong resident of Utah, has practiced dentistry since his graduation from the Northwestern University Dental School in 1918. He has served with distinction in positions of importance in local, state and national dental organizations and other related voluntary and official agencies.

Dr. Dalgleish was secretary of the Utah State Dental Association for two years, 1925 to 1927, following successively thereafter as president-elect and president. He is trustee of the American Dental Association's Thirteenth District. He provided leadership which attained and maintained for the public and profession in his state enactment of a reasonable dental practice act, and provision for appropriate dental representation in official health agencies.

R. C. Dalgleish

In dental programs fostered by governmental agencies, Dr. Dalgleish has worked unceasingly to enhance the prestige of dentistry as a health service. He helped establish a public dental health program consistent with the objective ideals of the profession, which broadened dentistry's recognition of its responsibility in providing dental care for all segments of the population.

Dr. Dalgleish holds a degree in public health (M.P.H.) from Harvard University, a valuable asset in his constant and worthy efforts to integrate dentistry into

highly important public health programs. His knowledge and assistance is invaluable to his state and to his profession.

VERMONT

William Raddin Pond of Rutland, Vt., has retired after practicing dentistry in the state for 50 years. He began his practice in Proctor in 1899, after graduation from the University of Maryland. Three years later he moved to Rutland and has been there since that time.

During his 50 years of practice, Dr. Pond has been president of the Rutland County Dental Society, the Vermont State Dental Society and the New England Society. He was on the board of dental examiners for ten years. He was the first Vermont dentist to be elected to the American College of Dentists, and he is a member of the New York Academy of Dentistry, a member of the First District Dental Society of New York and of the Pan-American Odontological Society.

W. R. Pond

Dr. Pond was the first dentist to develop the carving of amalgam. He gave many clinics and wrote a number of papers on the subject which were widely published in dental journals. Papers were read by him and clinics were given in Toronto, Albany, New York, Atlanta and many other cities. He also wrote many papers on diet and its relation to dental decay, and gave numerous clinics on the use of elevators in extracting teeth.

During the latter years of his practice, Dr. Pond specialized in orthodontia, and for many years was the only orthodontist in the state of Vermont. Although he has now withdrawn from active participation in the dental profession, he maintains his interest and is always available for counsel.

VIRGINIA

Richard Lee Simpson has always followed his own philosophy of life, "That which is almost right, is wrong!" which is probably the prime reason he continues to conduct a successful practice now in its 54th year.

Dr. Simpson was born in Fincastle, Va., on April 21, 1873, and as a youth displayed a keen interest in art and mechanical problems. These early inclinations fitted him mentally for the dental profession, and he was graduated from the University of Maryland School of

R. L. Simpson

Dentistry in 1896 with the highest standing in a class of 54 members. He practiced in Fincastle for eight years, moved to Richmond, Va., and in 1904, was elected president of the Virginia State Dental Association, and in 1905 began teaching dentistry at the University College of Medicine. He has continued to teach since that date, and he is now Professor Emeritus of Clinical Dental Prac-

tice at the Medical College of Virginia.

Dr. Simpson's devotion to organized dentistry has been exemplary, and he continues to be actively interested in affairs of local, state and national organizations. He contributes as unselfishly to the civic and religious life of his city as he does to dentistry. He still works with the same skill, interest and enthusiasm of years ago.

WEST VIRGINIA

Norman Hemstead Baker is responsible for the establishment of oral hygiene in the West Virginia State Health Department, which was later organized into the Bureau of Dental Health. It has been mainly through his educational efforts that the younger generations of the state appreciate the value of good dental health.

Dr. Baker received his D.D.S., *cum laude,* from the Dental Department of the Baltimore Medical College in 1909. He practiced briefly in St. Albans, W. Va., and moved to Charleston in 1912. He immediately became interested in physical education and child welfare, thus launching his intense efforts to promote his program, "Tooth Appreciation." He lectured widely in schools and other organizations on the subject.

In addition to serving many civic and charitable organizations without fee, he served many years as chairman or member of important state and component society committees, and has served on the Judicial Council of the A.D.A. He is the dental member of the Advisory Committee to the State Maternal and Child Health Division. He has worked constantly with the State Bureau of Dental Health.

Dr. Baker is past president of the West Virginia State Dental Society and has held important offices in component societies. His daughter, Mrs. Betty Baker Bartlett, is a 1936 graduate hygienist from the University of Michigan, and his son, Nathan P. Baker, is a dentist.

WISCONSIN

Henry Leo Banzhaf is prominent among the Wisconsin dentists who have made outstanding contributions to the advancement of the profession. Today, at the age of 84, he is still active and is currently engaged in writing an autobiography of his long and useful career.

Dr. Banzhaf was born at Hartford, Wis., on October 15, 1865. After graduation from the University of Michigan, he started practicing in Manitowoc, Wis., in 1886. In 1902, Dr. Banzhaf became dean of the Dental Department of the Milwaukee Medical College, which affiliated with Marquette University in 1907. His service to dental education became national in scope when he helped organize the Dental Education Council of America in 1910. Dr. Banzhaf served

N. H. Baker

H. L. Banzhaf

as secretary of this group, then the only recognized standardizing body of dental education, for ten years.

Dr. Banzhaf served as president of the Wisconsin State Dental Society in 1910, president of the National Association of Dental Faculties in 1915, and in 1924 was elected the first president of the newly organized American Association of Dental Schools. He served as the president of the A.D.A. during the 1926-27 term and as president of the American College of Dentists in 1927 and 1928.

The dental profession of Wisconsin can regard with pride Dr. Banzhaf and his commendable record of service to the dental profession.

WYOMING

Peter Appel was instrumental in founding the Wyoming State Board of Dental Examiners, and is holder of license number one in the state, but he is best known for his devotion to his profession and his constant service to his colleagues.

Dr. Appel is a native son of Wyoming. He was born in Green River in 1880 and was educated at public schools. He studied at the University of Wyoming and Northwestern University, receiving his D.D.S. degree from the latter in 1901. He returned immediately to Cheyenne, and has practiced successfully since that time. Dr. Appel's two sons, Walter K. and Peter W., are both graduates of Northwestern University Dental School and both are now practicing in Cheyenne.

P. Appel

In 1916 Dr. Appel organized the Wyoming State Dental Society and served as its president and secretary for several years. In 1936 he organized the Laramie County Dental Society, and at a state meeting in 1944 was honored by that group as "The Father of Dentistry" in Wyoming. He has been a member of the A.D.A. since 1910, a member of the International College of Dentists, and has served on the National Board of Dental Examiners for 12 years.

Due to failing health, Dr. Appel was forced to retire from active practice a year ago, but he continues to show an active interest in the welfare of the dental profession, not only in his native state but in the nation as well.

Advances in

SOCIAL RESPONSIBILITY

Harold J. Noyes, D.D.S., M.D.
Portland, Ore.
Editor

1900 • 1950

FEW DENTISTS remember the physical conditions under which the dental profession labored in 1900, when most dentists were using the foot engine to prepare cavities and the dental x-ray was not yet a part of their equipment. Members of the profession have even greater difficulty realizing the limited extent to which the average dentist considered himself responsible to his patient and his community.

By the turn of the century conscientious dentists and public-spirited leaders had promoted enactment of dental practice laws in most of the states. This movement began in the middle seventies and was practically completed before 1900. At the same time the profession was beginning to appreciate the advantages which accrue through group enterprise and exchange of ideas. Formation of the National Dental Association by the amalgamation of the Southern Dental Association and the American Dental Association was accomplished in 1897, though the complete amalgamation of these or-

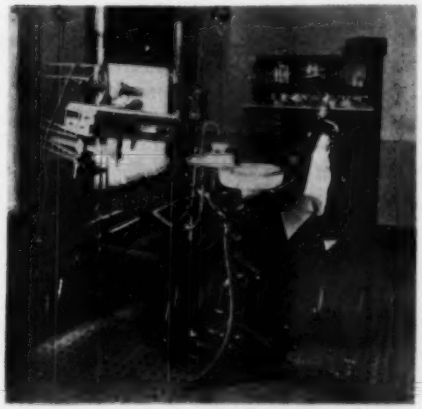
ganizations was far from a reality. There was, however, great hope for the future in the hearts of many, whose names were later to become famous, as they looked to Dr. G. V. Black, who was president of the National Dental Association for the year 1900-1901.

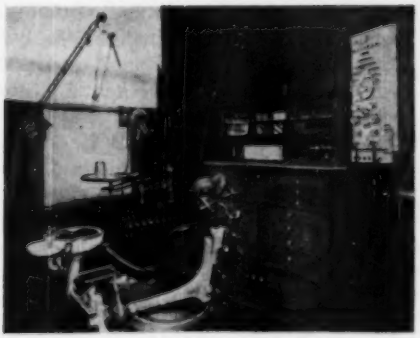
For the most part, the dentist of that day entered upon the practice of his profession with little more than a mechanical concept and technical training received in a short dental course or at the hands of a preceptor. His responsibility to his patient lay largely in the performance of individual technical tasks, principally extraction of teeth, placing of simple operative restorations and fabrication of full and partial dentures. With only occasional exceptions, he gave little thought to the prevention of dental disease and care of children, and even less to his role in the education of the public to the need and value of dental care.

The occasional dental service offered through the armed forces was performed by contract dentists who had the status of civilians. There was no United States Public Health Service as it is known today; existing bureaus and departments of government did not concern themselves with dental service.

There were a few leaders whose concepts were in advance of their time and who dreamed of the services which dentistry could render to society. These men, whose views have been preserved in the literature, formed the foundation and spearheaded the great advancement witnessed in the last half century.

The formation of the National Dental Association, bringing together the dentists of the North and the South, stimulated profoundly the reorganization of state and local societies in number, membership and power. Leaders in state dental societies, recognizing the need of a stronger national body, advocated a reorganization of the National Dental Association. This constitutional reform, which was put into effect in 1913, enabled all dentists who were members of their state and component societies to be-





Dental equipment during the first quarter of the 20th century. Upper: Typical dental office of 1900. Lower: Dental office of about 1920

come members of the National organization. Immediately membership in the National Dental Association jumped from 976 in 1913 to 11,883 in 1914. By 1922, when the organization reassumed its original name, the American Dental Association, membership had grown to 27,090. Today its active members number 68,404.

The papers which comprise this section of the MID-CENTURY ISSUE give an abridged and summary exposition of the advancement of dentistry's appreciation of its social responsibility in the particular fields which have been chosen for illustration. A vast difference exists between an awareness on the part of a profession of its responsibility to society and the domineering regimentation of a profession by governmental authority, currently known as the socialization of the profession.

DENTISTRY AND THE LEGISLATIVE PROCESS

Francis J. Garvey, LL.B., Chicago

IN A COUNTRY like ours which since the early days of the Constitution has been declared to be a government of laws and not of men, it is inevitable that a profession dedicated to the service of the public must in time become concerned with the mechanics by which laws are adopted that affect its sphere of service. It is likewise inevitable that in the discharge of its social responsibility the authorized agency of the profession must assume the position of spokesman with regard to the effect such laws may have upon the public which it serves, that sector of the public which is the particular charge of the profession. It was inevitable, therefore, that the dental profession sooner or later must concern itself with legislation and the legislative processes.

In the year 1897, the two existing dental associations, the American and the Southern, merged themselves into a single association, which until 1922 was known as the National Dental Association. It is significant that following recognition of the need for a nation-wide organization and its consequent establishment, one of the first acts of the new association was to establish a Committee on Legislation. While this group was to be the first national committee on legislation, it is necessary to remember that in the last quarter of the nineteenth century the individual dental associations had taken an active part in legislation at the state level, and as a result, in the 25 years between 1876 and 1900, 36 states and territories joined the three which had already adopted dental practice acts. This was an expression of social responsibility at the state level; the primary purpose of the practice acts was to insure that only qualified personnel would be permitted to practice dental surgery.

The Spanish-American War, with its resultant massing of troops, brought home immediately a serious defect in the organization of the Army; that is, the lack of provision of any regular dental treatment for either officers or enlisted men. Appalled by this situation the new association created the Committee on Legislation in 1898 for the purpose of establishing some form of a regularized dental service as a part of the medical departments of the Army and the Navy. In its first report, filed at the 1899 session of the National Dental Association (Trans-

actions, p. 54), the Committee recommended that legislation be sought to establish a dental corps in the medical department on the same basis as the medical corps, or in the alternative, to establish a dental corps of civilian dentists retained on a contract basis.

The First Successful Step

In the 56th Congress (1899-1900) the Committee caused to be introduced a bill to provide 130 dental surgeons for the Army. This was ultimately enacted into law in February of 1901, but instead of providing for a dental corps as we know it today, the act authorized the employment of a mere 30 dental surgeons on a contract basis. Although these dentists were duly appointed, it was soon learned that the Army prevented their full acceptance because they were not actually members of the Army. However, the utilization of these dentists, particularly in the Philippines, rapidly demonstrated the tremendous service to the Army which could be rendered by a permanent dental corps. As a result the Committee began a long fight to provide a commissioned corps of dentists for both the Army and the Navy with commissions granted in the grades of lieutenant, captain and major in the Army, and lieutenant (junior grade), lieutenant and lieutenant commander in the Navy. The new bill proposed a ratio of commissioned dentists on the basis of one for each thousand of authorized strength (Transactions 1902, p. 273).

The Surgeon General of the Army was in favor of the bill, but it was vigorously opposed by the Secretary of War and by the Navy Department. The fight continued unabated until 1910 and the reports of the battle may be found in the reports of the legislative committees in the Transactions for those years. It was a problem of give, take and compromise.

Army Finally Grants Commissions

In 1911 (Transactions 1911, p. 27) the Committee was finally able to report the enactment of a law granting commissioned status to Army dentists. This first law, however, permitted commissions only in the grade of first lieutenant. The next year the Committee was able to report (Transactions 1912, p. 35) that a law had been enacted authorizing the appointment of 30 assistant dental surgeons for the Navy who were to serve for three years in an acting or probationary status and then to be commissioned as lieutenants (junior grade). This law provided for a ratio of one dentist per 1,000 of personnel, but because of the Navy personnel strength of that day this limitation instead of expanding the number of dentists effectively limited the number who might be appointed to 15 instead of the 30 authorized.

The picture with regard to service in the dental corps of the armed forces has been continually changing since 1912. There has been constant pressure by the Association to improve the position of the dental corps in relation to the other corps of the various services, to provide for increased rank commensurate with the duties and responsibilities imposed upon dentists, and to provide for the right for dentists to administer dental affairs as professional men. Landmarks in the fight have been legislation creating a dental reserve corps, legislation gradually granting increased rank up to flag rank in the Navy and general officer rank in the Army, legislation and regulations improving the condition of services, and development of dental research within the services and other laws and regulations, the immediate purpose of which was to improve the dental care of military and naval personnel. That the foundation for proper dental practice in the armed services had been well laid is best evidenced by the tremendous service rendered by more than 22,000 dentists in the Army,

Navy, Air Force and Public Health Service during World War II.

Area of Effort Widens

It must not be thought that the entire efforts of dentistry in the field of legislation were concentrated upon the armed forces. It is true that in this field there was a need for a large expenditure of effort and the results achieved through the years more than justified that effort. However, as early as 1910 the Association turned its attention toward other legislative problems. In that year it adopted a resolution approving a bill to create a public health department at the federal level. Out of this bill ultimately evolved the organization which today is known as the Public Health Service. This, too, involved a long, hard fight extending over many years. In 1913 (Transactions, p. 24) the Association's Committee on Public Health attempted unsuccessfully to persuade Congress to create a Congressional committee on public health. However, during 1913-1914 Congress did create a National Bureau of Public Health, which legislation was supported by the Committee. At this time the Association went on record in favor of increasing the scope of the Bureau to department status and directed its legislative committees to pursue that objective.

In 1915 the Association supported the Harrison Narcotic Act and through its efforts obtained for dentistry the authority to prescribe and dispense drugs covered by the Act. Thereafter it supported constructive amendments to the Act and consistently voted appropriate regulations which would permit dentists to perform their professional functions without coming into conflict with the Act. It continued its activities in this connection in the late 1920's by supporting the adoption in the various states of Uniform Narcotic Laws intended to safeguard the health of the public within the boundaries of states in the same manner that the Harrison Act gave protection through the channels of interstate commerce.

Opposition to Patents

In 1910 a special committee of the Association was formed to oppose Congressional extension of the Low Patent which was then expiring. In conformity with its principles of ethics the Association believed that all practitioners of the healing arts are heirs of a wealth of accumulated knowledge, technics, instruments and methods of treatment contributed by others and that, therefore, the fruits of discoveries, labor and skill in the field of health service should be contributed by the discoverer to the common pool of knowledge without the payment of premiums to the discoverer. This committee operated successfully for several years until there was no further need for its existence.

Dental Hygienist Laws Supported

In 1916 the president of the Association, in his annual address, commented favorably upon the laws which had been enacted in several states for the licensing of oral hygienists, and the Reference Committee on the president's address in that year (Transactions 1916, p. 402) endorsed the activities of those states which were seeking such laws. The House concurred in this policy. This question was again given attention in 1922 (Transactions 1922, p. 60) when the Board of Trustees recommended to the House of Delegates the adoption of a motion favoring a uniform bill for the regulation of dental hygiene which included a draft of a model bill as part of its recommendation (Transactions, p. 138-140). This interest in the creation of auxiliary services, which has persisted to the present time, was a further expression of dentistry's consciousness for a need to expand its services to the public and a consciousness for a need of such services

The Dental Protective Association
OF THE
UNITED STATES OF AMERICA
This is to certify that
is a member in good standing of
The Dental Protective Association
of the United States

The certificate of membership of the Dental Protective Association of the United States. The organization was incorporated not for profit on December 4, 1888, under the laws of Illinois, by John N. Crouse, Edgar D. Swain and Truman W. Brophy for the purpose of protecting and defending dentists against patent abuses and infringements. The association successfully operated for many years and, having accomplished its objectives, was disbanded in 1938, with funds put in trust and established as the John N. Crouse Dental Endowment Fund for the advancement of the profession.

by the public. It is to be noted in studying the various laws authorizing the licensing of dental hygienists (and as late as the spring of 1950 the Legislature of Virginia passed a bill to license such personnel) the profession has ever been mindful that the work of the dental hygienist is primarily a function of the dentist and that it is, therefore, necessary that such work be carried on only under the supervision of a licensed practitioner if the oral health of the public is to be protected. Through the years the profession has sponsored amendments to the dental hygiene licensing acts extending the scope of the hygienist function when such extension was deemed necessary and advisable. In each instance both the adoption of the act and the extension of the duties have come about with the support of the state dental association concerned.

The Committee has not always concerned itself with laws so directly related to the health of the public as practice acts, national health laws, and the establishment of dental services in the armed forces. Immediately after World War I there was considerable pressure in Congress in its efforts to increase the national revenue to place an excise tax upon the use of gold for dental purposes. For several years the Committee was concerned with convincing the Congress that such a tax would be unjust in that it would increase the cost of dental treatment for the public without a concomitant increase in health service to justify such increased cost. During the same years the Committee was also called upon to re-

sist efforts to amend the tariff laws to place an increased duty upon the importation of dental and surgical instruments. At that time the duty was 35 per cent and the Congress proposed increasing it to 60 per cent. Through action of the Association the rate was kept at 35 per cent; thus the cost of dental treatment to the public was prevented from rising.

The Public Health Service

From 1928 to 1930 legislation to reorganize the U.S. Public Health Service was pending before the Congress. Because of the concern of this agency with dental health the Association participated actively in the development of the various bills which were considered. In 1930 it was able to report the enactment of a bill which coordinated the activities of the Public Health Service and which improved the position of dentists in that service. During the late 1920's, the Committee was expending a good deal of effort in connection with enactment of legislation to create a National Institute of Health which had for its purpose the investigation of human diseases in order to discover their cause, effect their cures and to develop standards in prevention. The first National Institute of Health was established by legislation, approved in 1930. In 1931 the Committee recommended close cooperation with the National Institute of Health to the end that the dental phase of all health problems may receive proper consideration and direct affiliation.

Thus it can be seen that from the very beginning of the federal government's interest in health research problems the American Dental Association was active in sponsoring the establishment of such an institute and in directing its activities into dental health channels. This line of thinking ultimately culminated in the introduction of a bill to create a National Institute of Dental Research, which legislation was finally enacted by the 80th Congress in 1948. The general terms of the National Institute of Dental Research provided for a $2,000,000 building and an annual appropriation of $750,000 for the purpose of carrying on dental research. While the Institute has been created and is now a functioning agency, the Council on Legislation is still seeking an appropriation to provide the authorized funds for the construction of the building. The establishment of the National Institute of Dental Research through the efforts of organized dentistry constitutes one of the landmarks in the expression of the social responsibility of dentistry to the public.

Opposition to Socialization of Profession

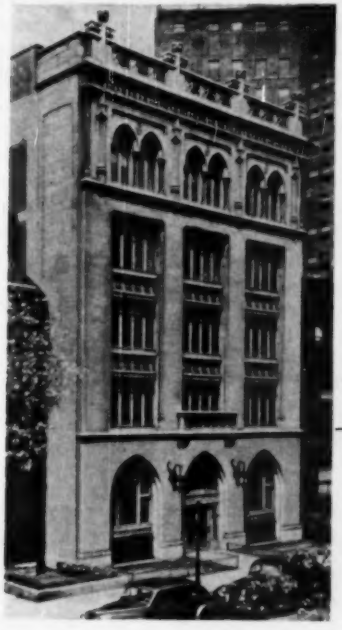
As early as 1931, the Committee on Legislation recognized the imminence of pressure for the establishment of a system of what was then called panel dentistry and is now generally referred to as socialized dentistry. In that year the Committee recommended to the House of Delegates that special attention be given to the problems of panel and children's dentistry in cooperation with the officers of the dental societies of the various states. Since that time increasing attention has been given by dentistry to the legislative problems involved in the extension of dental services to a greater proportion of the population. During the seven or eight years following this recommendation there was no need for legislative action in this field. Beginning with 1939 and the introduction of the first Wagner health bill, the problem has become increasingly important and the attention of the Committee has more and more been directed to the evaluation of myriad proposals for federal intervention in the field of actual practice of the health sciences.

The attitude of the dental profession toward compulsory health insurance has not been merely obstructive. The American Dental Association is firmly con-

vinced that the adoption of a system of national compulsory health insurance is neither the philosophical nor the practical answer to the health problems of the nation. The Association has not hesitated to endorse proposals which it felt were both necessary and proper subjects for federal action. Thus it sponsored the above-mentioned Dental Research Institute. It is supporting increased funds for the Armed Forces Institute of Pathology in order that a more detailed knowledge of disease may be obtained; it favored the Hill-Burton Act which provided for the survey of need and the construction of hospital clinic and health center facilities in rural areas; it is supporting the proposal to increase the supply of dental manpower by the expansion of existing dental schools and the establishment of new ones, part of the funds for which will come from the federal treasury; it supported activity and proposed some of the provisions of the National Health Bill introduced in the 80th Congress in 1947-1948, which had for its purpose federal grants to states for the provision of health care to those who were unable to pay for the cost of such care. By its recent action in San Francisco of restating in expanded and more detailed form its affirmative program for the improvement of the health of the community, state and nation, it has reiterated basic principles, some of them found in legislation upon which may be established and continued a sound method of health care for the entire country with regard to its dental needs.

The Traynor Law

For many years the entire profession has been concerned with illegal or unethical practice of dentistry which results in inadequate health care. To com-



The American Dental Association. Above: Former Central Office, 212 E. Superior St., Chicago, occupied from 1931 to 1943. Left: Present headquarters, 222 E. Superior St., Chicago, occupied since 1943

bat this evil, it has throughout the years attempted to strengthen its practice acts at state level to prevent the operations of untrained or unethical practitioners. While these efforts have been reasonably successful at state level, it was discovered that there was need for federal legislation to prevent the interstate operation of illegal prosthetic practice through use of the mail and other avenues of interstate commerce. To correct this condition the Committee caused to be introduced, and in 1945 was successful in having enacted, a federal law commonly known as the Traynor Law to prevent such illegal practice. After its enactment the Committee assisted in the prosecution of test cases which established the validity of the law and made its general enforcement possible.

At the conclusion of the first half of the twentieth century the Council on Legislation, as it is now known, is concerned with more than a hundred bills with direct or indirect interest to the profession, touching upon such diverse subjects as federal appropriations for the construction of buildings, greater administrative authority for the Armed Services Dental Corps with regard to dental practice, proposed increases in postal rates which would affect the dissemination of dental information through professional journals, the recognition of the well established dental specialties by the Veterans Administration, the establishment of one day each year as a permanent day devoted to the dental health of children, compulsory health insurance, federal aid to professional education, federal grants to provide for physical examinations and certain remedial treatment for children of school age; the omnipresent proposals for various forms of total health care, the establishment of a federal department of health, or conversely preventing the consolidation of health activities in a federal department devoted to many other fields, and at the state level with more than a thousand bills in the regular annual or biannual sessions of the 48 state legislatures affecting the dental health of the public and the manner of dental practice.

Truly this has been a half century during which the profession of dentistry has recognized and accepted its social responsibility in the field of legislation at the federal, state and community level. During that period its legislative interests have grown from the scrutiny of single bills which could be handled by a small volunteer committee to the place where the legislative phase of dental activity overlays every phase of the work of the Association and requires the service of a full-time staff to examine, evaluate and give effect to the policies adopted by the dentists of America in their efforts to obtain legislation which is necessary to assist in the development of better dental health for the people and in opposition to those measures which would tend to destroy that health.

DENTAL PUBLIC HEALTH

Norman F. Gerrie, Kansas City, Mo.

DENTAL PUBLIC HEALTH is a relatively new branch of public health and may be considered something of a newcomer among the careers available to dentists. It originated as it became clear that great segments of the population were in need of dental services. Public health departments had been in existence for many years, but their chief concern was in the control of communicable disease and en-

vironmental sanitation. Beginning about 1926, however, governmental interest began increasing in the health of the individual and in endeavors to make available to individuals the services needed for the prevention and cure of disease and the maintenance of health.[1]

Dental units of official public health agencies exist at three levels of government: local, state and federal. Each level has health functions and responsibilities conferred by law, either specifically or by delegation from other authority. Each has certain independent functions, but there are some joint functions which require cooperative activity for their performance. Objectives are held in common, although the selection of dental program activities and the degree of emphasis may vary widely.

The structure of government for health purposes is designed to provide for primary application of health activities to the people at the local level. Most funds are spent there. Local dental health programs, except in unusually prosperous or large urban communities, are frequently handicapped by lack of funds and "know-how." However, the state dental health program affords a source of advice and consultation and sometimes has funds to aid local communities. Beyond the state government, the federal government possesses resources for consultation and loan of personnel for the use of the states, and for local programs through the state departments of health. Although there are no federal appropriations earmarked for state or local expenditure in dental programs, there are federally appropriated funds for state health programs which may be spent for dental health purposes at the state and local level.

Development of Dental Public Health

Because the structure and content of dental public health programs are so varied, it is difficult to determine when, in this country, the first local program came into existence. Doubtless many communities would contest for the honor of being the first. Certainly one of the earliest was a dental infirmary established by the dental surgeons of New York state in 1849.[2] Beginning about 1910 several clinics for children were established by private interests and were subsequently taken over by local health departments or boards of education.

The first state health department dental program appears to be that of North Carolina. It began in 1918 and has had a continuous existence under the capable leadership of the original director.

Many of the early dental public health programs were the product of the interest of dental practitioners who recognized the need for special, organized programs in their communities and took the leadership in planning them. Many private dentists are still actively interested in community and other dental program activities and have made important contributions to the literature and practice in this field, although the majority of public health dentists today are engaged on a full-time basis.

Dental public health may be defined as that part of dentistry which is concerned with the study, prevention and control of dental diseases in the population as a whole. Dental public health has but one objective: to promote good dental health in the population. In achieving this objective the tools and methods of research, education and dental care are employed in an organized way for the formulation and conduct of community programs.

In its current state of development dental public health is somewhat behind that of public health in general. For example, on July 30, 1949, there were 1,291 full-time local health units serving 1,648 counties and 273 separate cities. In addition there were 51 state health districts organized primarily to supervise and advise 362 counties on health matters.[3] All of the states and territories have departments of health, and there are at

least 40 federal agencies which are engaged in health activities in some degree.[4] The total number of local dental programs of various kinds is unknown but is considerably less than the number of local health units. Forty-five states (all except New Mexico, Idaho and Vermont) have dental programs as an organized activity of their state health departments. Although organized dental programs had their beginning sometime before, most of this progress has been made during the last 15 years, chiefly because of the funds made available to states by the Social Security Act of 1935.

Organization

Previous to 1935 the organizational position occupied by dental health activities in state departments of health followed no particular pattern and varied considerably in administrative level from state to state. In a few instances, where the state had appropriated funds for dental activity, a high degree of administrative autonomy existed. Later, under the provisions of the Social Security Act of 1935, funds were allotted to the states for the establishment and conduct of activities for maternal and child health (MCH),[5] and, since dental caries was prevalent to a high degree in children, a portion of the funds was utilized to establish dental programs for children.

Because MCH funds were expended in the state dental program it was considered expedient to have the dental administrator responsible to the state MCH program director, particularly since the dental program was chiefly concerned with children. This arrangement would probably have become well-established had it not been for the concurrent rise of interest in dental programs for other segments of the population than children, notably industrial and institutional groups and adult groups affected by dental diseases such as pyorrhea and oral cancer. Although little or no funds, either state or national, were available for adult dental programs, a considerable proportion of dental administrative time was expended in consultative and advisory services for these groups, to whom the responsibilities of the state departments of health also extended.

State dental associations also were particularly sensitive to the degree of recognition attached to dentistry by its relative position in the administrative organization of the state department of health. Consequently a strong movement developed for the placement of the state dental program in an organizational position which carried the same degree of authority for independent action as other major subdivisions, and in which the director of the dental program would be responsible directly to the state health officer rather than to an intermediate individual. This movement was strengthened by the American Dental Association when it officially indorsed "division" status for state dental programs. As a result, most of the state programs now occupy division, or comparable, administrative status in state departments of health.

Earlier, when total state health department activity was limited, and there were few special programs, it was possible for the state health officer to keep in close touch with his personnel and the details of their programs. In most states this is no longer the case. The growth in number and size of specialized health programs has created internal problems in the administration of state health departments, owing to the manifest difficulties experienced by the state health officer. From 8 to 10 division directors report directly to him, each responsible for a specialized health activity or for various management functions. Furthermore, the number of activities promises to increase substantially in the next few years with the development of interest in the establishment of new special programs for the control of arthritis, dia-

betes, the allergies and chronic diseases.

Recent evolutionary developments in administrative reorganization of state health departments indicate the existence of a definite trend toward streamlining along functional lines. A number of states have made changes in organizational patterns to reduce the number of reporting divisions. The movement may be considered a step toward a simplified system in which the various special activities are grouped as sections under major functional subdivisions such as preventive medicine, environmental sanitation, administration, vital records, and so forth; in most instances the number varies from three to five. The very factors which led to a reduction in the number of persons reporting directly to the health officer predispose against any increase in the number of such persons by the creation of separate dental subdivisions. How well adapted the new functional position will be to the conduct and operation of the state dental program is not yet evident, but at least one state dental association and the American Dental Association have registered formal objection to the decrease in administrative status.

Need for Trained Personnel

The increase in number of dental programs has multiplied the need for trained personnel for their management, and brought into existence on the graduate level formal courses of instruction in dental public health administration. There are now a number of such courses at approved schools of public health in the United States and Canada where dental administrators may obtain Master's degrees in public health. Dental public health administration deals with the use of numerous fiscal, statistical, personnel, technical and educational procedures in the planning, establishment and operation of organized dental programs.

As an understanding of dental program content improved and objectives became established, it became evident that dentists who provided treatment for children, in either private offices or public clinics, would benefit from instruction in the improved technics and practices in the rapidly developing field of dentistry for children. Consequently, there was an attendant increase in courses of this kind both as a part of the regular postgraduate curriculum in the dental schools and in the form of brief refresher courses and institutes under the joint sponsorship of state dental associations and the dental divisions of the state departments of health. At the present time many state dental divisions routinely provide funds for the attendance of private dentists at short, intensive courses of a week or two in dentistry for children at a large number of dental schools.

Education of the Public

From the beginning of dental public health activity, education has been considered a dental public health function of major importance, and educational measures have been employed to acquaint the public with the advantages of good dental health and the consequences of neglect. Until relatively recent years these educational efforts consisted largely of a mixture of facts, opinions, fads, concepts and fancies presented by persons who were in a position to impart their ideas to the public. Few were discriminating or scientific in their choice of material and fewer still were fortified with educational knowledge or technics. Consequently the scientific accuracy of the material and the methods of presentation left much to be desired. A progressive step to place dental health education on a more scientific basis is found in an excellent study made in 1942 of the educational materials used in schools.[6] Other later work of a similar nature[7,8] brought a balanced criticism of much of the educational material in use. The content of present material is, in most cases, highly

acceptable and factually accurate. The public health dentist is now more likely to subject old and new statements and reports to careful scrutiny before using them in his program. This carefully selected and authoritative educational material is directed to school teachers, public health nurses, the lay public and the dental profession itself.

It is now generally recognized by dental public health administrators that the education of the public is a task for trained educators who are familiar with educational technics, leaving the dentist to check the technical and scientific accuracy of the content.

Statistical Studies

Before the advent of modern dental public health practices, interested dentists endeavored to secure information on the extent of dental caries in children by recording their observations during dental examinations made on groups of children. Lacking a more objective way of tabulating quantitative data, the results of these examinations were expressed in numbers of cavities, extractions, prophylaxes, and so forth. From these examinations came evidence of the widespread occurrence of caries and need for treatment. Because the obvious next step after discovery of a cavity was its treatment with a filling, the examination was chiefly a case-finding mechanism for screening out children in need of treatment, plus a device for estimating the number of fillings and extractions needed. Although these dental examinations were helpful in describing dental needs in terms of number of fillings or extractions required, they provided no satisfactory baseline from which might be determined the prevalence of caries and the number of new carious teeth to be expected annually. Exact information was not obtained until 1938 when the report of the famous Hagerstown survey was published.[9] There, for the first time, were worked out and applied, for dental caries, epidemiologic principles similar to those which had been used so effectively in the study of numerous other diseases. Because dental caries leaves on the teeth ineradicable quantitative evidence of its occurrence, it was now possible to determine with exactness the dental caries attack rate (DMF) in a population group, by age, and the average number of new carious teeth or surfaces which might be expected in each age group annually.

Epidemiologic data collected from many different communities soon established those features of caries experience which could be used for program planning, appraisal, and application for a variety of specialized purposes. This development of quantitative measures constitutes one of the most significant advances in dental public health because it affords a tool by which can be studied the dental disease of greatest proportions at this time. It may be used also as a guide in the establishment of programs for the control of caries and, later, for program evaluation,[10] indicating evidence of progress or need for change in emphasis. A recent refinement uses a simplified version of the same technic to obtain baseline data of sufficient accuracy for most purposes.[11] It is the form of survey most commonly used now in large city and area-wide surveys where exact individual data are not important.[12]

Dental Requirements

Efforts toward the establishment of dental health programs are both stimulated and discouraged by the magnitude of the need for dental services found in all ages of the population. A review of some selected studies shows that the dental requirements of different age groups vary considerably.

In the Hagerstown, Maryland, study[13] the average school child was found to need 0.5 extractions and to have about three permanent tooth surfaces requiring

fillings. The average 6 year old child needed about three surfaces filled, compared to 3.2 surfaces at age 12 and 4.9 surfaces at age 19. The need for extractions ranged from 0 at age 6 to 0.5 at age 12 and 1.0 at age 18.

The Guggenheim Dental Clinic surveyed more than a million elementary school children and reported an average need, for both permanent and deciduous teeth, of 5.3 fillings and 1.3 extractions.[14]

A survey by the Committee on Economics of the American Dental Association[15] on 7,541 patients in dental offices, ages 15 years and over, found that the average adult requires about 4.4 fillings and 2.2 extractions. Approximately one out of every four required either a fixed or removable bridge; about one out of every six required a partial denture; 14 per cent required full upper dentures and 9.2 per cent required full lower dentures.

Treatment Program

The predominate dental need among children is for fillings, and there is evidence that neglect in this age group is responsible for much of the need of older age groups for more extensive types of restorative services. Consequently, an element of prevention has been incorporated into public dental health programs which emphasize early discovery and filling of carious teeth for children as a means of obviating or delaying the transition of dental need to the more expensive and time-consuming restorative services required by adults. Recognition of the progressive character of the consequences of neglect, plus the relatively limited amount of dental services available, is mainly responsible for the emphasis in present day dental programs on the dental health of children. It is considered sound practice to spend limited funds and personnel time on dental services for children in order to reduce the need for more expensive and time-consuming treatment of adults.

Emergency treatment spread thinly over a large group is generally regarded as a waste of operating time and funds; if funds are limited, it is a better course to reduce the number of children in the program than the amount of care provided for each child. Accordingly, it is now deemed preferable to provide adequately for the needs of each child included in the program and to include children up to the limits of time or funds. Somewhat the same decision was reached with respect to age; the care of younger children has come to be regarded as a more economical investment of operating time provided the same children are included in the program over a period of years. The order of treatment services in dental programs has been worked out on a priority basis of "first things first," with relief of pain heading the list and high relative importance given to preventive measures.

Belief in the value of good nutrition as a protective factor against dental caries persisted until recently when a review of the evidence indicated a lack of scientific basis for the inclusion of nutritional guidance in dental programs for the control of caries. The same is true of the value of milk in the dietary of children for the purpose of "growing strong teeth to resist decay," and of the use of vitamins for the same purpose.

Studies on the relationship of excessive amounts of refined carbohydrates to caries,[16,17,18] have been followed by recommendations in dental health educational programs for restriction of these items in the dietary. Many state departments of health now offer *Lactobacillus acidophilus* count service to practicing dentists as a diagnostic aid in the control of rampant caries.

Promotion of the fluoridization of public water supplies by the addition of fluoride, up to 1.0 to 1.5 ppm. for curbing the development of dental caries in children, is a routine part of the state dental program in some states.[19,20] These state

departments of health, through their divisions of dentistry and sanitary engineering, offer technical and advisory assistance to communities interested in fluoridization. Most state health departments, however, have observed a more conservative attitude and are delaying adoption of this activity pending the outcome of a number of community experiments in fluoridization which have been in operation for several years.

Problems of Administration

Public appreciation of the rewards of good dental health is not spontaneous; it must be cultivated. Because dental diseases are not communicable, are chronic in character, lack dramatic qualities and ordinarily are not fatal, they are regarded with a high degree of tolerance by the public at large. To overcome these attitudes of complacency and indifference, and lead people to recognize their dental health needs and make better use of their community health facilities, has not been an easy educational task. Although educational effort has been expended with some success in this direction for many years, it has not been too rewarding in areas where services were unavailable or beyond the purchasing ability of those in need.

The lack of funds for the support of dental programs represents a very real problem in most places, because of the comparatively high cost of attaining dental health goals where treatment services form a substantial item in the dental budget. Even when funds are available, the general shortage of dental personnel, particularly those trained in dental public health practice, reduces program efficiency.

Full utilization has not been made, in the majority of operating dental programs, of the knowledge, tools, methods and devices which have been developed during recent years as aids in the conduct and administration of dental health programs. Many valuable resources have remained unused because of lack of understanding and "know-how" on the part of those responsible for the program. In

Past presidents of the American Dental Association, Minneapolis, 1928. First row, left to right: J. P. Buckley, T. B. Hartzell, R. H. Volland, J. V. Conzett, W. H. G. Logan. Second row: J. D. Patterson, F. O. Hetrick, D. M. Gallie, T. P. Hinman, C. N. Johnson, W. A. Giffen, H. J. Burkhart. Third row: Henry L. Banzhaf, M. F. Finley, L. L. Barber, Homer C. Brown, C. V. Vignes, H. E. Friesell, S. W. Foster

recent years, however, through articles, reports, meetings and conferences, as well as institutes and formal training, knowledge of dental public health practices is being extended more widely and the quality of administration and program content is improving.

Not long after the examination of children for dental defects became a part of dental programs it was found that it was not sufficient to discover children in need of attention and notify the parents. For various reasons, repeated annual examinations would find the same children in a progressively poorer state of dental health. Intensive educational stimulation helped some. The development and adoption of the dental referral card proved to be a valuable device for increasing the number of children receiving care. The card, in addition to notifying the parent of the need of the child for dental treatment, carries a recommendation that arrangements for treatment be made with the family dentist and provides space for the signature of the dentist when treatment is completed. The card is then returned to the school. Failure to return the card provides occasion for cooperative action by the teacher and public health nurse to determine the reason. Once the reason is known, it is possible for them to take intelligent steps to aid the child in securing needed care. When properly used as an adjunct to the dental program, the referral card system has proved its merit, and currently is employed in many programs in areas having practicing dentists.

Other than by activity reports of a quantitative sort, which included such items as number of pieces of educational and other literature distributed, number of talks given to various groups, number of fillings placed and teeth extracted, the qualitative objective evaluation of dental programs was not possible until the advent of epidemiologic studies and the interpretive analysis of findings. These studies, made at intervals in the same community, are now useful in giving direction to the dental program and in determining content and degree of indicated activity in various phases of the program.[10,21,22] Used as a measuring device, the DMF rate presents tangible evidence of progress toward selected objectives and, where improvement is not apparent, points out likely avenues by which it might be secured. Combined with quantitative activity reports, the DMF yardstick has placed in the hands of the dental program administrator an effective tool with which to measure both his accomplishments and his problems.

Because he sees the mass effects of dental caries, the public health dentist is somewhat more sensitive to the need for mass methods of control and prevention than is his colleague in private practice working with individual patients. As might be expected, the public health dentist is eager to search for and try various promising technics which appear suitable for mass application. Until recently the only procedures of consequence in caries control were the filling of carious teeth and advocacy of a diet low in refined carbohydrates. As understanding of the caries process improved, investigators unearthed clues which gave rise to a wide diversity of laboratory and clinical experimentation in methods of prevention. As the result of these experiments, the value of topical sodium fluoride for the reduction of new caries in children was proved[23] and it became the first procedure suitable for mass preventive measures in dental health programs. Interference with the caries process by the reduction of refined carbohydrates in the diet,[24] as a feature of organized programs, has proved useful when combined with and reinforced by school nutritional studies and other related dental health activities. A recent study on brushing of teeth after eating has shown that good results may be secured in reduction of new caries,[25] and the recommended dental health practice of brushing for hygienic reasons

presumably will be strengthened by the additional caries-preventive value to be secured.

As new and promising technics for the prevention of caries are developed in the laboratory, their value must be tested clinically and methods worked out for their practical application in the dental office and in dental programs. This testing has given rise to a relatively new activity in dental public health known as "administrative research," in which new technics and methods are tried out in order to learn how best they may be used on a wider scale. When a sufficient amount of information has been secured it is customary to establish demonstration programs in selected areas for the purpose of showing how the procedure might work out on a practical basis. Dental public health encourages the widespread adoption and use of these preventive measures as soon as their value has been demonstrated scientifically, and strives to develop methods for bringing them to as many persons as possible.

Survey, case-finding or screening methods, referral systems, DMF rates, program planning, analysis and evaluation, administrative research and demonstrations and education are not peculiar to dental public health. They represent the application, in the specific field of dental health, of fundamental principles, procedures and mechanisms which have long been employed in the sound administration of public health programs. Before these tools were adapted to dental public health purposes, dental programs were established and conducted by rule of thumb, empiricism, opinion and experience. The dental program today which does not utilize these modern tools is unable to make the most of its opportunities. The task of securing and maintaining good dental health in the population is so great that only by the intelligent application of total resources is it possible to attain that objective. The combined interest and effort of all groups and health agencies are called for; it is not a job for any one group or agency.

Predictions for Future

Speculation unrelated to fact is worth little serious consideration; however, the evidence presented by a series of related events should afford some indication, in a general way, of future developments affecting dental public health which might be anticipated.

Consistent with the general growth and expansion of public health activities of all kinds, and dental health is an accepted part of public health practice, there is nothing which would indicate that dental public health activities will not continue and expand. The number, scope and content of community dental programs promises to increase as the result of the stimulus afforded by increasing appropriations of funds from local, state and national sources and increasing interest on the part of organized dentistry and the public. There will be wide variations between programs because they must be adapted to local differences in needs, resources and inclination. There will be a great deal of experimentation with different types of programs.

Programs will be planned, established and conducted according to sound policies and principles, and there will be general use of improved methods of evaluating administrative programs.

More useful and productive educational technics and materials doubtless will be developed to bring about in the population an improved understanding of the principles and practices of good dental health. A corresponding improvement may be expected in the factual content of dental health education.

The administrative tools of the public health dentist will increase in number and usefulness. Measures for the prevention and control of dental caries will be developed by research to the point where this disease will no longer be of significant proportions. Before this point

is reached, simplified methods will have been devised for classifying other consequential dental diseases and disorders such as pyorrhea and malocclusion. An epidemiology of periodontal diseases will be developed; the main emphasis in public health dental programs will shift from dental caries in children to the prevention and control of pyorrhea and allied disorders in adults.

There will be changes in the undergraduate curricula of dental schools which will better prepare graduates for their responsibilities as important and essential elements in the civic and social structure of the communities in which they live. Dental students will understand more clearly the organization and functions of dental public health activities and expect to participate in them intelligently when occasion arises.

As an integral part of the community in which he lives the private dental practitioner is the most important single resource for providing for the dental needs of the people. As such, it is recognized as essential that he be included in any organized community effort with respect to dental health. Conversely, it is apparent that he cannot afford to be indifferent to his share of responsibility for participating in the planning and conduct of dental health activity in his community. Consequently, it may be expected that the future will see an ever-increasing appreciation by the private dentist of the extent of his responsibility for the dental health of the people in his community—an awareness of his obligations, perhaps—leading to a more effective joining of his authority and skill to that of the public health dentist and achievement of the ultimate goal of better dental health for the public.

1. Reed, Louis S., The Setting: Medical-Social Background. In Pelton, W. J., and Wisan, J. M. (editors), *Dentistry and Public Health*. Philadelphia: W. B. Saunders Company, 1949, p. 8.

2. Salzmann, J. A., *Principles and Practice of Public Health Dentistry*. Boston: Stratford, 1937, p. 62.

3. Federal Security Agency, *Annual Report of the Public Health Service, 1949*. Washington, D. C.: U. S. Government Printing Office, 1950, p. 90.

4. Cady, Frank C., Federal Dental Health Programs. In Pelton, W. J. and Wisan, J. M. (editors), *Dentistry and Public Health*. Philadelphia: W. B. Saunders Company, 1949, p. 329.

5. *Social Security Act of August 14, 1935*. Washington, D. C.: U. S. Government Printing Office, 1935.

6. Irwin, V. D., and Wilson, N. W., *An Evaluation of Dental Health Literature*. St. Paul: Bruce Publishing Co., 1942.

7. The Michigan Workshop on the Evaluation of Dental Caries Control Technics. *J.A.D.A.* 36:3 (Jan.) 1948.

8. Sydow, P. F., and Kopel, H. M. (editors), *Growth, Development and Health Problems in Dentistry*. Ann Arbor: University of Michigan Kellogg Foundation Institute, 1948.

9. Klein, H.; Palmer, C. E., and Knutson, J. W., Studies on Dental Caries. I. Dental Status and Dental Needs of Elementary School Children. *Pub. Health Rep.* 53; No. 19, May 13, 1938. Reprint No. 1932.

10. Knutson, J. W., Evaluating Dental Health Programs. *Pub. Health Rep.* 57:1087 (Aug.) 1942.

11. Knutson, J. W., Simplified Procedure for the Collection of Basic Data for Dental Program Planning and Appraisal. *Am. J. Pub. Health* 37:1439 (Nov.) 1947.

12. Hagan, T. L., Dental Caries Prevalence and Tooth Mortality—A Study of 24,092 Georgia Children in Twelve Communities. *Pub. Health Rep.* 62:1757, 1947.

13. Klein, H., and Palmer, C. E., The Disparity Between Dental Need and Dental Care in School Children of Hagerstown, Md., and Environs. *J.A.D.A.* 28: 1489 (Sept.) 1941.

14. American Dental Association. Committee on Economics: Incidence of Dental Defects in Children, 1939.

15. Walls, R. M.; Lewis, S. R., and Dollar, M. L., *A Study of Dental Needs of Adults in the United States*. Chicago: American Dental Association, 1941.

16. Jay, P., The Role of Sugar in the Etiology of Dental Caries. *J.A.D.A.* 27:393 (March) 1940.

17. Becks, H.; Jensen, A. L., and Millarr, C. B., Rampant Dental Caries: Prevention and Prognosis. *J.A.D.A.* 31:1189 (Sept.) 1944.

18. Jay, P., Reduction of Oral Lactobacillus Acidophilus Counts by the Periodic Restriction of Carbohydrate. *Am. J. Orthodontics (Sect. Oral Surg.)* 33:162 (March) 1947.

19. Russell, A. L., *Fluoridation of Community Waters*. Mimeographed Report of the Division of Dental Health. Pierre, S. D.: South Dakota State Department of Health, November 1, 1949.

20. Faber, H. A., The Status of Fluoridation in 1949. *Am. Water Works J.* 41:1061, 1949.

21. Knutson, J. W., Appraising the Dental Health Program. *J.A.D.A.* 29:543 (April) 1942.

22. Knutson, J. W.; Maday, C., and Jordan, W. A., Simplified Appraisal of Dental Health Programs. *Pub. Health Rep.* 62:413 (March) 1947.

23. Knutson, J. W., and Scholz, Grace C., The Effect of Topically Applied Fluorides on Dental Caries Experience. VII. Consolidated Report of Findings for Four Study Groups Showing Reduction in New Decay by Individual Tooth and by Tooth Surface, and Frequency Distribution of Newly Decayed Teeth in Treated and Untreated Mouth Halves. *Pub. Health Rep.* 64:1403 (Nov.) 1949.

24. Jay, P., Laboratory Tests for Caries Activity, and Their Application. In Pelton, W. J., and Wisan, J. W. (editors), *Dentistry and Public Health*. Philadelphia: W. B. Saunders Company, 1949, pp. 120-34.

25. Fosdick, L. S., The Reduction of the Incidence of Dental Caries. 1. Immediate Tooth-Brushing with a Neutral Dentifrice. *J.A.D.A.* 40:133 (Feb.) 1950.

DENTISTRY RECOGNIZES ITS RESPONSIBILITY TO THE PUBLIC

Harold J. Noyes, D.D.S., M.D., Portland, Ore.

THE MOST SIGNIFICANT evidence of dentistry's recognition of its responsibility to society came within the period encompassed by the fourth decade of the twentieth century when in 1938 the American Dental Association, speaking with the authority of its 45,243 members, adopted eight principles with respect to plans on dental health care which are:[1]

1. In all conferences that may lead to the formation of a plan relative to a (dental) health programs, there must be participation by authorized representatives of the American Dental Association.

2. The plan should give careful consideration to: First, the needs of the people; second, the obligation to the taxpayers; third, the service to be rendered, and fourth, the interests of the profession.

3. The plan should be flexible so as to be adaptable to local conditions.

4. There must be complete exclusion of nonprofessional, profit-seeking agencies.

5. The dental phase of a national health program should be approached on a basis of prevention of dental diseases.

6. The plan should provide for an extensive program of dental health education for the control of dental caries.

7. The plan should include provision for rendering the highest quality of dental service to those of the population whose economic status, in the opinion of their local authorities, will not permit them to provide such services for themselves, to the extent of prenatal care, the detection and correction of dental defects in children, and such other service as is necessary to health and the rehabilitation of both children and adults.

8. For the protection of the public, the plan shall provide that the dental profession shall assume responsibility for determining the quality and method of any service to be rendered.

The resolution says in effect that it is the business of the dental profession to serve those people that are financially able to bear the cost of dental care for themselves and families and that, in addition, it is the duty of the dental profession to cooperate in the development of programs which will provide service to those whose economic status does not enable them to assume this expense. The recognition of this responsibility was further clarified in 1944 when the House of Delegates of the American Dental Association reduced the previous eight principles to these four:[2]

1. Research: Adequate provisions should be made for research which may lead to the prevention or control of dental diseases.

2. Dental Health Education: Dental health education should be included in all education and treatment programs for children and adults.

3. Dental Care: (a) Dental care should be available to all, regardless of income or geographic location. (b) Programs developed for dental care should be based on the prevention and control of dental diseases. All available resources should first be used to provide adequate dental treatment for children and to eliminate pain and infection for adults. (c) Dental health is the responsibility of the individual, the family and the community in that order. When this responsibility, however, is not assumed by the community, it should be assumed by the state and then by the federal government. The community in all cases shall determine the

methods for providing service in its area.

4. In all conferences that may lead to the formation of a plan for dental research, dental health education and dental care, there should be participation by authorized representatives of the American Dental Association.

Dental Care for Children

Many of the evidences of advance in the dental profession's concept of its social responsibility are related to this signal turning point in professional development. For this reason, it seems expedient to limit this paper to certain developments which may have contributed to the action of the American Dental Association in 1938 and to other equally significant philosophies which lie behind investigations, studies and programs arising directly or indirectly from this commitment and which were instituted in the latter part of this period.

As dental organization grew at the local, state and national level, opportunities of increasing magnitude were afforded for intercommunication of ideas and convictions between members of the profession and between members of the profession and other individuals and agencies concerned with public health and human welfare. These multiplying avenues of communication played a major role in the formation of professional opinion. Early in the century the value of care for children was recognized.

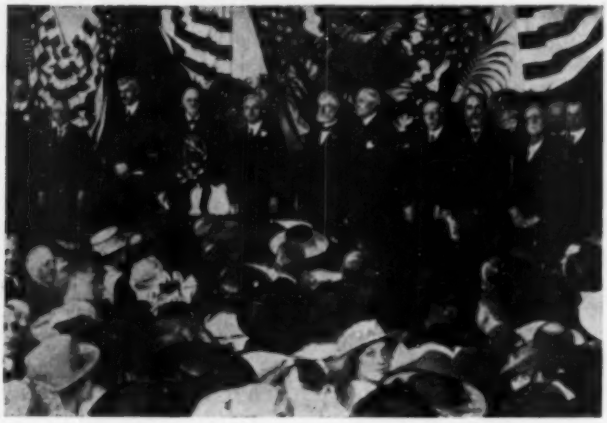
At first dental attention centered largely on clinical care for children. The Forsyth Dental Clinic was established in 1914 and the Rochester Dental Dispensary was established with an endowment by George Eastman in 1915. Prophylactic school clinic care was emphasized by the programs of A. C. Jones in 1916. Later the literature is replete with reference to preventive care for children,[3, 4, 5] and soon dental health education[6-9] was included in school programs.

Dental Health Education

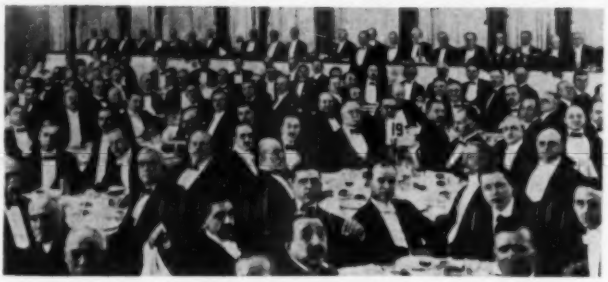
Programs for dental health education of adults developed simultaneously with demands for the care of adults. During the depression of the thirties numerous adult educational programs were motivated in part by the excess of dental manpower over the demand for dental service. There was an interval at this time in which the dental profession viewed with considerable alarm the development of dental clinics. Gradually, however, as service clinics, fostered by philanthropic institutions, hospitals and service agencies, called upon the dental profession for assistance and consultation with respect to plan and policy, this apprehension diminished and the profession gained a more realistic idea of the necessity for dental assistance to the indigent and people earning low incomes.

The thinking which preceded and accompanied the reorganization of the United States Public Health Service during the years 1928-1930 made a valuable contribution to the development of dentistry's responsibility to the public. The development and expansion of dental services, both in the United States Public Health Service and in the public health departments at state and local levels, have arisen largely through the efforts of the dental profession.

The improvements that have taken place in dental education during the last half century have influenced the profession's concept of its social responsibility. As years were added to the predental and dental training, the profession attracted, and indeed demanded, students possessing a broader educational foundation and greater maturity of mind. At the same time, courses were introduced and later expanded which dealt with dental history and the socioeconomic place of dentistry in the fabric of society. As graduates with these advantages took their place in the ranks of the profession, their



Dedication of Rochester Dental Dispensary May 9, 1917. Name was changed to Eastman Dental Dispensary in 1942



Dinner, Jan. 20, 1917, honoring Mr. Thomas A. Forsyth who founded the Forsyth Dental Infirmary for Children in Boston, 1914

Mrs. DeLos L. Hill presenting $50,000 check to Judge Hugh M. Dorsey, chairman of the Board of Trustees of the Atlanta-Southern Dental College, to establish the DeLos L. Hill, Junior, Memorial Dental Clinic for Children, September 25, 1931

DENTISTRY FOR CHILDREN

influence was felt in the development of dentistry's increasing social consciousness.

The concomitant growth in other groups interested in social welfare had its impact upon dentistry. The need for social planning developed a profession of its own. Communities began to select individuals that were trained for social service. Health centers and institutions for the care of children, the infirm and the aged recognized their dental needs and came to the dental profession for assistance. The first and subsequent White House Conferences and the development of the Children's Bureau which grew out of this activity further exemplify a broad nation-wide movement.

Responding to these intrinsic and extrinsic influences the profession came to realize the importance of dental care for all, and it also came to realize that the profession must be considered the agency for consultation in all plans and programs which include the dental health care of the public.

Appraisal of the Problem

Once the dental profession was committed to its position as the responsible agent for the dental health of the population and the logical agency for consultation in dental health matters, it set about earnestly to appraise its problem. During the early part of the century there had been sporadic investigations that dealt with the extent of oral disease, such as the studies made by the committee on oral hygiene of the National Dental Association. In 1909-1910, Dr. W. G. Eversole, Cleveland, Ohio, chairman of the oral hygiene committee conducted a dental health study of children in four public schools of that city. In the same year Dr. Fredrick A. Keyes carried on similar studies at St. Vincent's Orphan Asylum in Boston. Surveys were made in 1922-1925 by the United States Public Health Service to determine the prevalence of tooth decay of 12,435 school children. A dental examination of 1,438,318 children, ages 6 to 14, in 26 states was conducted by the United States Public Health Service in cooperation with the American Dental Association in 1933-1934.[10]

A comprehensive study of dental caries incidence in children was undertaken by the United States Public Health Service at Hagerstown, Maryland,[11] at a time contemporary with the formation of the afore-mentioned resolutions adopted by the House of Delegates of the American Dental Association in 1938. The many programs for examination, and in some instances care, of school children offered further information that has proved of value. Studies giving information on the needs of the adult population have all contributed to a vast expansion of knowledge both with respect to the unmet dental need[12,13] and with the annual increment of dental disease.

Paralleling the studies which were made of the prevalence and incidence of dental disease were others to determine the manpower of the dental profession. In 1941 the Committee on Dental Economics of the American Dental Association undertook a survey of the dentists practicing in the United States.[14] These data were given to the profession in 1946. Studies were also made of the number of dental hygienists, the number of dental assistants and dental technicians. Although data concerning personnel in the latter three categories are difficult to ascertain with accuracy, by 1946 there was sufficient valid information for the subcommittee on personnel of the dental section of the National Health Assembly to present a realistic report on dental manpower. It is interesting to note and perhaps not without significance that Mr. Ewing, in his book, *The Nation's Health*,[15] chose to ignore the data contained in this report.

Because pilot studies indicated that the demand for dental care is closely correlated with spending power, an appraisement of the dental problem requires a

knowledge of the cost, needs and ability of the public to pay for dental care. In this facet of the inquiry the dental profession not only utilized its own services at national, state and local levels, but also engaged the cooperation of educational institutions. Representative of the studies of the time are the publications of Committee on Costs of Medical Care;[16] Swanish;[17] Beck;[12] Walls, Lewis and Dollar.[13]

No consideration of the problem of dental service can be complete without a careful analysis of the dentist's productivity determined by the extent and effective use he makes of physical and mechanical facilities such as office equipment, office management, modern technics and the number of ancillary personnel he employs. From the rather superficial studies which have already been reported,[18] it is evident that the dentist can multiply his service no less than 25 to 30 per cent by the use of two chairs and adequate assistance both at the chair and in the laboratory. Two valuable studies by the United States Public Health Service are in progress at the present time; one at Woonsocket, Rhode Island, the other at Richmond, Indiana. Although these investigations deal with care for children, they will furnish data that may be applied in some measure to adult dental care. In these studies an attempt is being made to provide care for all of the school children in the respective cities through private practitioners in the area and by dental clinics that are operated by United States Public Health Service in the public schools. An accurate record was made of the unmet dental needs at the time the studies were started and an accurate record is being kept of the amount of time required to complete dental care for each child, the amount of additional care that is needed annually and the number of operative hours necessary to provide this service.

A most important segment of the overall problem of dental care, a phase recognized in the resolutions of 1938 and 1944, embraces the application of known measures for prevention of oral disease and the pursuit of new knowledge through research. In 1938 Dean and others,[19] utilizing the foundation data laid down by G. V. Black and Frederick S. McKay, who made studies of mottled enamel and geographic distribution (1916), and Schour and Smith, who produced experimental dental fluorosis (1934), provided the evidence that minute quantities of sodium fluoride reduced the incidence of dental disease.

National Level

The last ten years have witnessed a distinct development of coordinated planning within the various offices and councils of the American Dental Association. The Council on Dental Economics has continued to gather and organize information concerning the number of dentists, their location and the cost of rendering dental services.

The Council on Dental Health has set up a plan of state dental health councils, which are subdivided into councils at district or local levels. These provide a mechanism for the study of problems in all areas of the United States where dental societies exist. This far-reaching plan has a twofold advantage: it provides the profession with an opportunity of acquainting the public with the needs and possibilities of dental health service and the relationship of dental health to general health; it broadens the profession's concept of its social responsibility. The contributions of the Council on Dental Health are too numerous to itemize, but note should be made of the initiation of pilot and test programs in which mechanisms have been set up for exploring various means of amortizing the expense of dental services with the view to relieving the impact of sudden heavy dental bills upon the individual or the family.

The Council on Legislation of the Association has been of invaluable as-

sistance in discouraging the establishment of premature and ill-considered plans for meeting social problems, and in promoting the enactment of legislation which has contributed to constructive progress.

In the latter part of the half century many branches of the federal government began to realize the importance of improving the nation's health. Although, at first, dentistry was given little consideration, it has gradually, but not entirely, earned the right to be considered as a mature and independent cooperating unit in the planning and execution of programs arising at a federal level.

The United States Public Health Service and the Children's Bureau have initiated programs which have been carried out at state and regional levels through cooperation of the state departments of health, and state and local dental societies.

Other federal bureaus and departments, such as the Department of Agriculture and the Department of the Interior, have included dental health service in programs which have come under their supervision. Perhaps the most notable failure to provide adequate dental care is that of the Bureau of Indian Affairs under the Department of the Interior. This neglect is not the result of failure on the part of Indian agents and medical and dental officers, but rather it is the result of their inability to gain support from higher levels in the federal government.

The greatest advances in the armed services and the greatest contribution to complete care for their personnel were made prior to 1940, but their work has continued.

State Level

An increased interest at the state level in problems of public concern is evidenced throughout the nation. The dental health workshops, initiated by the Council on Dental Health during the last five years, have done much to stimulate action of the profession and the public. In many states for the first time representatives from district societies gathered together to discuss the dental health problems that exist in the various geographic areas of the state. The dental health workshop has proved a realistic technic for evaluating dental health needs and the resources which are available to meet them.

The state departments of public health have expanded their activities, increased their personnel and improved their administrative framework. Much credit is due the American Dental Association for its persistent efforts to stimulate all states to provide themselves with an executive dental officer in the State Department of Public Health. The financial assistance, furnished by the Children's Bureau and the United States Public Health Service, has been an important factor in increasing the facilities offered within the State Department of Public Health for dental care for children.

Local Level

Dentistry's recognition of its social responsibility at the local level within communities and sections of the large cities has much the pattern of the state, although its exact technics and facilities vary widely with the particular region. The energy and initiative of public-spirited dentists furnish the spark which motivates the local society to action and fortunately, in many cases, kindles the interest and energy of others who carry on and expand original programs. Some large cities have found it expedient to establish health centers in various regions, particularly those inhabited by low income and indigent people. The city government establishes an integration of social service, medical and dental care. It is common practice, in the dental as-

pects of these programs, to utilize the consultation and guidance of the dental profession.

Personnel

In appraising and planning for increased dental care, certain representatives of the public and the federal government have laid great stress on the need for increased personnel and have been most articulate in the demand for training of more dentists. Some have suggested that the length of the dental course be reduced. A few have demanded that changes be made in dental practice acts permitting technicians to perform dental services. Neither group has considered the influences of economic conditions upon the effective demand for dental care or maintenance of the present high standards of dental service.

The dental schools have responded by accepting larger classes, and during World War II they operated on a 12 month instead of a 9 month basis. In this way the 4,400 hours of the four year dental course were provided in three calendar years with no more reduction in effective levels of education than is inevitable because of the 30 per cent increased burden placed on facilities and teaching personnel.

The schools have been criticized to some extent for not continuing the accelerated program of the war period or making urgent demands upon their financial resources for increases in plant, equipment and staff. Their reluctance to acquiesce in this expansion policy springs from the knowledge that:

1. The demand for dental services is proportional to the per capita income in the area, and that in periods of economic well-being this demand is much higher than it is in periods of depression.

2. No less than two years of baccalaureate education and four academic years of dental training is necessary in all dental schools. The predental applicant who enters school in the fall of 1950 will not be graduated for the practice of his profession until 1956. Having lived through cycles of economic change the dental schools are somewhat hesitant to materially increase their investment in physical plant and facilities only to have it go begging during the time of economic recession. They are reluctant to accept classes swollen to the basis of economic prosperity, and graduate them in the unhappy conditions of the lower limits of the economic cycle.

3. The productivity of existing dentists can be increased through utilization of ancillary personnel and modern equipment and office procedures.

The opinion prevails among dental educators that a limited number of dental schools should be added in strategic areas of the United States and Canada and that all should maintain capacity enrolment with occasional increases if the physical facilities can be obtained; however, they caution against further expansion and advise strict adherence to educational standards.

There is emphatic need for training of dental hygienists and dental assistants, and need for improving the standards and resources for preparing dental technicians.

Certainly dentistry has in this first half of the century awakened to a realization of its responsibility in the broad social fabric and it has set steadfastly about its business of gathering facts and testing means which will lead to the realization of dental care for all. This is a far call from a hasty plunge into ill conceived plans or programs arising through political incentive and operated at a federal level.

Conclusions

1. There has been a tremendous advance during the last 50 years in the extent to which the dental profession has recognized its social responsibility.

2. The outstanding attainment was recognition by the profession of its share of responsibility for the dental health care of the entire population as exemplified by the statement of principles issued by the Association in 1938.

3. The success of dental health education programs, through which the public have become aware of the need and value of dental care, the increase in population in the United States and the increase in the per capita wealth have combined to produce an unprecedented demand for dental service. Unfortunately, this latter and perhaps transitory condition has led some people to underestimate the accomplishments of the dental profession in the last half century.

4. The dental profession by intensifying its research activities, improving its educational program and developing more effective methods for the administration of dental care has laid a foundation for the realistic attainment of its acknowledged objective. For an immediate plan of action the American Dental Association recommends that suitable steps be taken to accomplish six objectives:[20]

a. The prevention of dental diseases through the application of preventive technics as soon as they are demonstrated to be scientifically valid; the support of intensified dental research with adequate funds, personnel and facilities.

b. The control of dental diseases by the expansion of community dental programs, integrated in the general health program, to make dental care and dental health education available to every child.

c. The provision of additional facilities and uniform standards for dental care by making dental services available in hospitals and health centers for inpatients and outpatients.

d. The recruitment of an annual enrolment of dental students equal to the capacity of all dental schools to increase the number of qualified dentists.

e. The adoption of measures to make dental practice in smaller cities and rural areas more attractive and rewarding in order to procure a better distribution of dentists.

f. The employment of dental hygienists as auxiliary aids to the dentist, and the provision of additional courses for those who desire to qualify for positions in public health departments and schools.

5. A critical analysis of existing data reveals that the proposal to solve the dental health problem by short-cut methods, including national health insurance and other panacea acts of legislature, is no more than puerile indulgence in wishful thinking if not a ruthless expedient to political approbation and power.

6. Though there is need for further implementation of planning and practice and a broader participation by the individual dentist, there is no need for embarrassment or apology for the record of the last 50 years.

7. It is appropriate that the dental profession should, from time to time, review its accomplishments, acknowledge its deficiencies and critically evaluate the amount, nature and direction of its progress; then proceed to the attainment of the goal so clearly revealed in the first half of the twentieth century.

The editor of this section is indebted to Homer C. Brown, Otto W. Brandhorst, Leon R. Kramer, Mrs. Josephine P. Hunt, associate librarian of the American Dental Association, and Mr. George Batterson, educational adviser, University of Oregon Dental School, for their valuable assistance in compiling this material.

1. Transactions of the American Dental Association, eightieth annual session, October 1938, p. 323.

2. Transactions of the American Dental Association, eighty-sixth annual session, October 1944, p. 380.

3. Oakman, C. H., Oral Hygiene. *J.N.D.A.* 2:20 (March) 1915.

4. Jones, A. C., The Keystone of the Oral Hygiene Movement. *Items Interest* 35:116 (Feb.) 1913.

5. Ebersole, W. G., History of the Oral Hygiene Campaign as Inaugurated by the Oral Hygiene Committee of the National Dental Association. *D. Cosmos* 53:1386 (Dec.) 1911.

6. Sutton, Willis A., Health and Education. *J.A.D.A.* 12:273 (March) 1925.

7. Stephen, F. W., Oral Hygiene in Our Public Schools. *Am. D. J.* 2:50 (Jan.) 1903.

8. Braithwaite, Earl S., Mouth Hygiene Lecture for High School Students and Adults. *J.N.D.A.* 8:2 (Nov.) 1921.

9. National Dental Association Committee on Oral Hygiene in Public Schools. *D. Cosmos* 44:400 (April) 1902.

10. Cady, Frank C., An Analysis of Two Nation-Wide Dental Surveys. *J.A.D.A.* and *D. Cosmos* 34: 1879 (Nov.) 1937.

11. Klein, Henry, and Palmer, C. E., Studies on Dental Caries. *Pub. Health Rep.* 53:1685 (Sept.) 1938.

12. Beck, Dorothy F., *Cost of Dental Care for Adults Under Specific Clinical Conditions.* St. Louis: American College of Dentists, 1943.

13. Wells, R. M., *Study of the Dental Needs of Adults in the United States.* Chicago: American Dental Association, 1941.

14. American Dental Association Committee on Dental Economics, Distribution of Dentists in the United States. Chicago, 1946.

15. Ewing, O. R., *The Nation's Health.* Washington, D. C.: U. S. Government Printing Office, 1948.

16. Committee on the Costs of Medical Care. Chicago: University of Chicago Press, 1932.

17. Swanish, Peter T., *The Cost of Dental Care Under Health Insurance.* Chicago: The Chicago Dental Society, 1938.

18. Klein, Henry, Civilian Dentistry in War-Time. *J.A.D.A.* 31:648 (May) 1944.

19. Dean, H. T., Endemic Fluorosis and Its Relation to Dental Caries. *Pub. Health Rep.* 53:1443 (Aug.) 1938.

20. The Program of the American Dental Association. An Immediate Plan of Action. *J.A.D.A.* 38:513 (April) 1949.

Dentists share knowledge and social responsibility internationally: Left, above: Allan G. Brodie receives the Villain Prize and Mrs. D. L. La Chance receives the Miller Prize posthumously for her father, the late William H. G. Logan, from A. E. Rowlett, president of the Fédération Dentaire Internationale, in Boston, 1947. Extreme left, Henri Villain, president of the Fédération Dentaire Nationale Francaise and brother of Georges Villain, late president of the F.D.I. Extreme right, Juan V. Carrea, Buenos Aires, Argentina, winner of the Miller prize.

Right, above: Dentists aid war-torn countries by sending dental books overseas. Clyde S. Minges, president of the A.D.A., Stanley D. Tylman, chairman, and Don J. F. Aubertine, member of the Council on International Relations, with the first check received by the A.D.A. October 1949 for the purchase of dental books through CARE for the Dental School of the University of Torku, Finland.

Below: This mobile dental office and mobile x-ray unit, designed to take health services to rural areas, were shipped to Uruguay in March 1950 by the United Nations International Children's Emergency Fund.

Advances in

DENTAL LITERATURE

Gardner P. H. Foley, M.A.
Baltimore, Md.
Editor

1900 • 1950

THE LITERATURE of dentistry in America at the opening of the twentieth century was no longer in its infancy. The book literature was already a hundred years old and periodical publication in this country (and also in the world) had existed for more than 60 years. The number of books on dentistry published in the United States in the nineteenth century was (according to Andres Weber) 552. From the inauguration of dental journalism to the end of the century, 138 journals had been begun in the United States. Most of these proved ephemeral, but 47 of those initiated by 1900 were published for five years or longer and cannot, therefore, be considered merely abortive attempts. Six of these early journals are among the longest-lived in the history of dental periodicals, and three are still being published. The total number of annual volumes for the period from 1839 through 1900 was something over 700. Therefore the total book and periodical dental literature published during the nineteenth century, taken together, constitutes a sizable body, between 1,250 and 1,300 volumes.

The periodical literature of a profession indicates its contemporary interests

more than do its books. The discoveries, inventions and technics are reflected in the pages of the journals at the times when they are novel, experimental or controversial. Thus it is possible, in the periodical literature, to get a cross section of the interests and knowledge of the profession at every point in the past. The periodical literature of dentistry, like that of any other profession, is important historically as a record of change and progress.

PERIODICAL LITERATURE

The year 1900 closed with 31 dental periodicals being published, and during the next half century 229 new dental periodicals were initiated, making a total of 260 journals published at some time between 1900 and 1949. The distribution of journals being published is shown by years in the graph, and the distribution of journals begun is shown in five-year periods in the table on page 772.

The number of volumes published during this period was more than 2,500. The extent of the development of the periodical dental literature, over that of the preceding century, is indicated by these statistics.

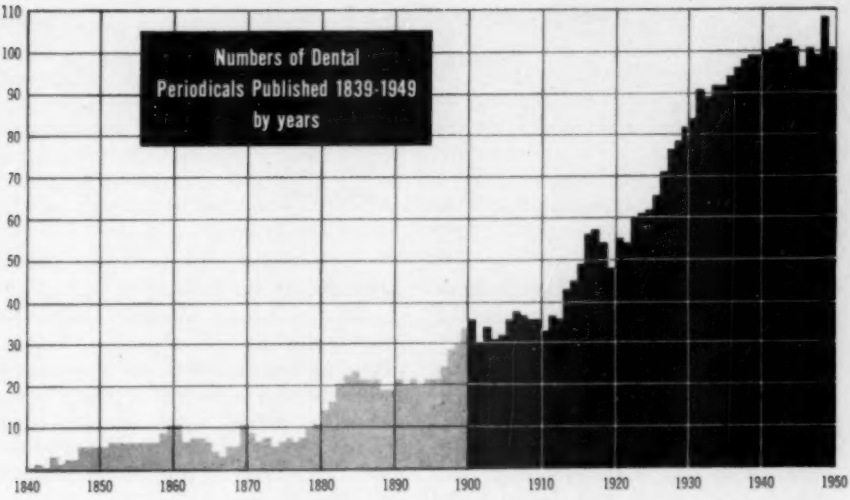
PROPRIETARY VS. INDEPENDENT JOURNALISM

The publication of dental journals during the nineteenth century was sponsored by four different agencies. These may be classified as (1) individual dentists or groups of dentists who published the journal as a private adventure; (2) dental organizations, national, state, or local in character; (3) manufacturers or dealers in dental supplies, and (4) dental schools and colleges. To this list of sponsors must be added a fifth in the twentieth century; namely, the commercial publisher.

The history of most of the longer lived journals involves several shifts in the character of sponsorship, and some of the periodicals have run almost the entire gamut of possibilities in this regard. The earliest dental periodical, *The American Journal of Dental Science,* for instance, began as the organ of the first national dental society, became in the second series the personal property of an individual dentist, Chapin A. Harris, and during its existence in the third and fourth series, was the property of two different supply houses.

Respectable, and sometimes excellent, journals were produced by all types of sponsorship; but very early, as a matter of principle, the question was raised of having professional journals owned and controlled by agencies outside the profession. Journals owned by some manufacturers were conducted more or less as advertising sheets; and ultimately it was realized that a potential danger of such abuse always existed under such sponsorship. The conflict between the two types of sponsorship did not become critical until late in the nineteenth century.

Through the *International Dental Journal* and later through the *Journal of the Allied Dental Societies* dentistry made earnest and promising attempts to establish and promote independent journalism. But because of the competition of powerful and well conducted proprietary journals, which could offer a low sub-



scription price and attract some of the best contributors, the efforts toward independent dental journalism did not prove immediately successful. Ultimately, however, the first half of the twentieth century witnessed a decline in the number and prominence of proprietary journals and a more than equal compensatory development of journals supported by dental organizations, national, state, local and with special interests. This is demonstrated by the fact that the report on journalism to the American College of Dentists in 1939 recorded that 73 dental periodicals were owned by dental professional organizations as against 11 privately owned.

The Proprietary Journals

Dental Cosmos.—Among the hundreds of dental journals published since the beginning of the profession's periodical literature in 1839, *Dental Cosmos* stands out, not only as the journal with the longest life, but as the publication with the most impressive record of contribution. No other journal can match the historical example of this lodestar of the literature. Much of this success of the *Cosmos* from its inception was due to the excellent editorship of J. D. White, J. H. McQuillen, James W. White and E. C. Kirk before 1900.

In 1901 the *Cosmos* was in a strong position to maintain its generally accepted position as the outstanding dental journal of the world. Its first issue of the new century was sent out to 39,000 dentists, to every English-speaking dentist whose address was available.

The publication of the *Cosmos* was sponsored by the largest dental manufacturing house in the country, the S. S. White Company, a firm that had contributed extensively to the advancement of dental practice over a long period. The journal proved profitable, for it gave prestige to the publishers in this country and abroad.

The record of the *Cosmos* during the 36 volumes issued from 1900 to the end of its career in 1936 reveals the work of a consistently capable and industrious organization.

The *Cosmos* had a neat, attractive appearance. The superior quality of its con-

Distribution of journals begun in five-year periods

Year	*Journals*	*Year*	*Journals*
1900-1904	18	1925-1929	31
1905-1909	17	1930-1934	25
1910-1914	28	1935-1939	12
1915-1919	43	1940-1944	9
1920-1924	28	1945-1949	18

tents was the result of a long-standing policy that yielded the best material available.

Edward C. Kirk, who was editor of the *Cosmos* from 1891 to 1930, is generally regarded as the leading dental editor of the first half of the twentieth century. Like most of the prominent contemporary editors, Dr. Kirk demonstrated remarkable versatility of interest and accomplishments. He gained prominence as a contributor to the literature, as a leader in dental education and as a participant in the advancement of dental organization. In 1917 Dr. Kirk withdrew from all his strictly professional activities and accepted a directorship in the S. S. White Company.

During Kirk's long regime as editor, the *Cosmos* rendered a great service to the profession, notwithstanding its sponsorship by a commercial organization. During the years when the profession apparently was unable or unprepared to support its own journalism, the *Cosmos* continued to give dentistry a publication of which it could be proud.

Kirk's editorials were a strong factor in the building of his reputation as an editor. Possessing a homely but effective style, being familiar with every phase of dental practice and active in all movements for the advancement of the profession, Kirk was exceptionally well equipped to write editorials that voiced the best thinking and reflected the progressive activities of the profession.

L. Pierce Anthony, who succeeded Dr. Kirk as editor in May 1930, had been associated with the *Cosmos* in various capacities since 1903. Anthony, during his brief tenure of the editorship, demonstrated his fine capabilities by maintaining the traditional standards of the *Cosmos* during a period when it was being severely attacked by the profession as the chief protagonist of proprietary journalism.

The strong current of dental journalism sponsored by the profession early in the century helped to sharpen the issue between professionally sponsored and proprietary journalism. The trend was particularly unfavorable to the *Cosmos* as the leading proprietary journal. In consequence, in 1936 the S. S. White Company and the American Dental Association effected a merger of the *Dental Cosmos* with the *Journal of the American Dental Association*. With the December 1938 issue, the name of the *Dental Cosmos* appeared for the last time.

Dental Brief. — In August 1896 Dr. Thomas B. Welch established a dental journal entitled *Welch's Monthly*. After the publication of the first volume Welch sold it to the L. D. Caulk Company, of Philadelphia. With the second volume the title of the journal became the *Dental Brief*. Dr. Welch retired as editor in 1899 and was succeeded by Dr. Wilbur F. Litch.

The *Dental Brief* averaged about 800 pages a volume. The majority of its articles were concise, dealing mainly with the art of dentistry. Relatively little space was given to the proceedings of

dental society meetings. Its strength lay in the various departments devoted to the practical interests of its readers. From 1904 until 1909 each issue of the *Brief* contained one of a series of biographical sketches of the pioneers of American dentistry written by Dr. Burton Lee Thorpe, later published in *Koch's History*. The editorials were an important feature, reflecting the cultural interests of Dr. Litch and his vigorous advocacy of progressive ideas.

On the death of Dr. Litch in December 1912, Dr. Alfred P. Lee, a member of the faculty of the School of Dentistry, University of Pennsylvania, was appointed to the editorship. Dr. Burton Lee Thorpe and Dr. William H. Trueman were named as associate editors. The publishers decided to discontinue publication of the *Brief* with the December 1913 issue.

Dental Summary.—The *Dental Summary* was a journal with unusual title experiences. On January 1, 1881, the Ransom and Randolph Company, Toledo, began the publication of the *Ohio State Journal of Dental Science,* with Dr. George Watt as editor. In December 1887 the journal's name was changed to *Ohio Journal of Dental Science*. When the January 1902 issue was destroyed by a fire in the printing office, the owners decided to change the title again, and so, beginning with the twenty-second volume, January 1902, the journal was published as the *Dental Summary*. When it was discontinued with the December 1925 issue, the *American Dental Surgeon,* begun in November 1925, adopted the volume number of the *Summary* and continued publication to 1932.

The *Dental Summary* was edited by Dr. Louis Bethel throughout its run under that title. After eight years as associate editor, Dr. Bethel had assumed the editorship in 1893.

The *Summary* for many years was the official organ of the state dental societies of Ohio, Michigan, Indiana, Kentucky, Louisiana and West Virginia; also of the Northern Ohio, Northern Indiana, Eastern Indiana, Southwestern Michigan, Odontological Society of Western Pennsylvania, Lake Erie and several local societies.

Until the end, the journal sought to increase its practical value to the general reader. In 1913 a new department, "The Business Side of Dentistry," was instituted. The expanding emphasis on prosthetics was a prominent feature of its last several years.. The editorial section suffered from an intrusion of commercial interests, and its presentation of illustrative materials was conspicuously inferior to the work of its competitors.

Later it became the property of Dr. James Taylor, then of Dr. Jonathan Taft and finally it was acquired by a firm of dental dealers which ultimately became Samuel A. Crocker and Company of Cincinnati.

Dental Register.—In January 1901 the *Dental Register* began its fifty-fifth year. When the publication of the *American Journal of Dental Science* finally was suspended in 1909, the *Register* became the oldest dental journal in the United States. Founded in 1847 as the *Dental Register of the West,* it was owned by the Mississippi Valley Association of Dental Surgeons. It described itself as the "pioneer dental journal of the United States."

Dr. Nelville S. Hoff, Ann Arbor, Michigan, became its editor in 1900, succeeding Dr. Jonathan Taft. Dr. Hoff combined his editorial activities with a career in dental education as a member of the faculty and as dean of the School of Dentistry, University of Michigan.

The volume of 1923 revealed a gradual running-down of the journal. The November issue was not distributed, and no December issue was printed. A reprint of the last number was made in January 1941 in order that dental libraries might have the complete run of the *Register*.

Dental Review. — The *Dental Review* originated in November 1886 as a nonproprietary journal, owned and edited by Dr. Alison W. Harlan. After 10 years Dr. Harlan, finding it impossible to fulfil adequately his multiform obligations as publisher and editor of a journal, practitioner and dental educator, sold the *Review* to H. D. Justi and Son, "with privilege of editing it in my own way."

Except for 1894, when C. N. Johnson was in charge, Dr. Harlan edited the *Review* from its beginning to 1902.

In 1902 Dr. C. N. Johnson succeeded Harlan as editor. Under the direction of Dr. Johnson the *Review* continued as one of the leading journals of the profession. Like his predecessor, Johnson achieved a wide reputation as a writer and as an educator. Through the 17 years of his editorship his reputation was steadily strengthened by his active relations with many of the country's leading dental societies.

Short articles and the proceedings of dental meetings formed the major parts of the *Review's* contents. Although its lists of authors indicate a growing dependence on contributions from members of the powerful Illinois society, it ranked second to the *Cosmos* in the range of its circulation. Besides the editorials, Dr. Johnson did a column titled "Editor's Desk" in which he wrote informally on topics extraneous to dentistry.

With the last issue of 1918 the Justi Company discontinued publication, giving the increased cost of publication as the reason for its withdrawal from the field of journalism.

Dental Digest.—The *Dental Digest* is one of the two dental journals that have lived through the first 50 years of this century.

Its publication was begun in January 1895 by Dr. J. N. Crouse, Chicago, to furnish a journalistic medium for advancing the interests of the Dental Protective Association, of which Crouse was the organizer and the president. In 1906 it became the property of the Twentieth Century Supply Company. The Dentists' Supply Company of New York City assumed ownership in January 1909.

Dr. John P. Buckley edited the *Digest* for a short time. He was succeeded by Dr. George Wood Clapp, who served as its editor more than 20 years.

For several years it remained true to its purpose of presenting summaries of the important papers published in other dental journals, both domestic and foreign. The *Digest* took pride in its "News Summary" section, a melange which apparently developed a strong reader interest.

Under the direction of Dr. Clapp the *Digest* gradually changed its character, especially in its emphasis on the economic aspects of dental practice.

In the 1920's the *Digest* began to widen its sphere of coverage by inaugurating new sections titled "Dental Laboratories" (papers presented before the Dental Laboratories Association), "Dental Secretaries and Assistants" and "Dietetics and Health."

In 1932, when a new publisher, Dental Digest, Inc., and a new editor, Dr. Edward J. Ryan, the *Dental Digest* was reborn. Its new purpose was to "present that information that can be translated into immediate and practical use" in the dentist's office.

Dental Items of Interest.—*Dental Items of Interest,* the patriarch of current dental periodical literature, is now in its seventy-second volume. Despite its erratic publication experiences, it has occupied throughout the half-century period a prominent place in the literature.

In July 1879 Dr. Thomas Welch began the publication of *Items of Interest* as a medium for promoting his own dental product. With the fifth volume it became a genuine dental journal. Welch served as editor until June 1896, when he sold

the journal to the Consolidated Dental Manufacturing Company. This company changed the name, in 1916, to *Dental Items of Interest*, and published it until 1920. Ultimately it became the property of the Novocol Chemical Manufacturing Company, owned by a dentist, Dr. Mendel Nevin, and his family. In March 1925 the Dental Items of Interest Publishing Company was incorporated by the Nevin family.

Dr. Rodrigues Ottolengui began his long association with the *Items of Interest* and *Dental Items of Interest* when he accepted the editorship in July 1896. He continued as editor until his death in 1937.

Dental Items of Interest followed a policy of limited affiliations with dental societies and specialized in exclusive contributions; that is, articles which were written first of all for publication in the journal rather than for presentation at dental society meetings.

During the 1900's the journal, primarily because of the editor's personal interest in the specialty, published the proceedings of the new American Society of Orthodontists and "did more than any other publication to further the interests of orthodontists and to advance the science of orthodontia."

As a keen analyst of the needs of the general practitioner, Ottolengui was constantly on the alert to secure good writers to furnish special serialized articles on subjects of particular interest. These serials written by specialists dealt at length with such subjects as gold inlays, porcelain fillings, dental roentgenology, maxillary sinusitis and oral infection, fixed bridgework, orthodontia, oral surgery and many others.

Several of the serialized contributions were later published in book form by the Dental Items of Interest Publishing Company. The serialization method of presentation has been a strong feature over the years and has also represented the journal's close alliance with the textbook publishing activities of the parent company.

Perhaps Dr. Ottolengui is best remembered by the generations of his readers as the conductor of the "Around the Table" department, the most successful editor-reader venture in the history of dental journalism. It has played an important role in the journal since the first meeting of the club in January 1914; it survives its founder as a perpetuated feature under the direction of the present editor.

Dr. Ottolengui died in July 1937, and was succeeded by Dr. Paul H. Belding, who is the present editor.

The Independent Journals

For many years after 1852 there were no regular journals published by dental organizations. But there were always one or two journals published by practitioners, as individuals or in groups. These journals sponsored by practitioners represented such "independent" dental journalism as existed until after 1900, and they took up the cudgels against proprietary journalism in the sense of those owned by dental manufacturers and dealers in supplies. Foremost among these was the *International Dental Journal*.

International Dental Journal. — The experience of the *International Dental Journal* forms an interesting and extremely important chapter in the contest of the profession for independent dental journalism. The existence of this journal was a challenge both to the profession whose best interests it cherished and to the commercial interests who sponsored competing journals. The failure of the profession to support this truly professional journal and the economic pressures applied directly and indirectly by the competing commercial journals ultimately led to the end of this fine journal.

The *International Dental Journal* was

in its twenty-second volume at the beginning of the century. Its history began in 1880 with the founding of the *Independent Practitioner* in Baltimore. Shortly after its establishment, its publication was assumed by an organization of dentists identified as the New York Dental Journal Association. Dr. W. C. Barrett, of Buffalo, a strong advocate of independent journalism, became its editor. Later a stock company, the International Dental Publication Company, was formed to purchase the journal. The title was changed, in January 1889, to the *International Dental Journal*. Dr. Barrett was succeeded in 1888 by Dr. W. Sudduth, another prominent figure in the movement for independent dental journalism. Dr. James Truman became editor in 1890 and conducted its affairs through the last issue in December 1905.

Dr. Truman deserves high rank among dental editors. Through 16 volumes he worked under great handicaps, many of them imposed by the profession itself, to give dentistry a journal it desperately needed in its struggle to achieve recognition as a learned profession.

The experience of the *International Dental Journal* in its attempt to compete with the proprietary journals and to obtain deserved support from the profession epitomizes the conditions governing dental journalism during the first part of this century. Dr. Truman's journal rendered a great service not only by its excellent contents but also by its symbolization of a need. Its failure was a gleaming reminder to the profession of a lost opportunity.

Because of nationally prevalent economic conditions the commercial journals reduced their subscription prices to $1.00. The *International*, with a $2.50 rate, could not meet this new pressure of commercial competition.

It is not generally known that the *International Dental Journal* was offered the National Dental Association as a gift. The publishing company made its first offer in 1903, when the Association requested time for consideration. Dr. James Truman was appointed by President Noel as chairman of a committee to consider the question of assuming ownership of the *International*. The committee made a favorable report at the Buffalo meeting in August 1905. In spite of an ultimate acceptance, the publishers of the *International* withdrew their offer because of delays. Thus the ownership of a good journal was rejected, and the publication of a journal by the National Association was postponed for eight more years.

The Journal of the Allied Dental Societies.—In April 1906 publication of *The Journal* was begun. In 1908 the name was changed to *The Journal of the Allied Societies*; and in 1913, to *The Journal of the Allied Dental Societies*. During its 13 volumes it repeatedly proclaimed its purpose of converting the profession to an effective appreciation of the advantages to be derived from independent journalism. Beginning with the support of four societies in New York and Boston, it extended a warm welcome to other societies to join in the effort to give dentistry a good nonproprietary journal. The valiant effort made by this quarterly ended in December 1918, with only six sponsoring societies, limited to New York and Massachusetts. But the societies were able to continue their valuable efforts to advance the cause of professional journalism by supporting the *Journal of Dental Research*.

The Journal of the American Dental Association.—The long considered reorganization of the National Dental Association was finally effected at the Kansas City meeting in 1913. It was now a truly representative organization, with the legislative authority vested in a house of delegates elected by the various component societies. From a membership of 800 in 1911 the Association grew rap-

Progress in Dental Literature. Journal of the American Dental Association, 1913 to 1950

idly to a membership of 12,000 in 1914. The state societies also showed large increases in their memberships.

In 1911 the Association passed a resolution setting aside one dollar from the dues of each member for the use of a journal the organization planned to publish. Plans for issuing a quarterly bulletin were approved.

The *Official Bulletin of the National Dental Association,* a quarterly, made its debut in November 1913.

Although a publication staff had not been organized and the contemplated increase in membership dues had not been put into effect, the Association decided to adopt the new name of *Journal of the National Dental Association.* Still a quarterly, the *Journal* was published in March, May, August and November of 1915. The third volume, the last as a quarterly, was published in March, May, July, and November 1916. With the 1917 volume the *Journal* started its career as a monthly and began to show promise of meeting the expectations of its ardent supporters. Its 1,375 pages indicated the strong support given to it by the various state and local societies. With the April issue Dr. Otto U. King became editor and general manager, with three associate editors to assist him.

With the 1920 volume the *Journal* came of age. It evidenced great improvement over the preceding volumes in both content and presentation. It claimed the world's largest dental journal circulation and had made deep inroads on the subscription, advertising and contributor lists of the proprietary journals. The best articles came from its own organization, emanating from its meetings and its research projects. The fertility of this source of supply enabled it to surpass even the *Dental Cosmos* in the quality of its contents.

At the 1922 meeting the name of the Association was changed and with the August issue the journal was given its third title, THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

The successful publication of a journal by the national body was the result of many factors. Financial support was made available by the greatly enlarged

membership under the reorganization plan, which also afforded a large and immediately applicable circulation list. The conviction that dentistry was a learned profession was becoming more and more widely accepted by dentists. This highly improved professional attitude was conducive to a practical demonstration of pride and interest in dentistry's own journal. The growing public recognition of the importance of oral diseases gave great impetus to the dentist's interest in his national organization and in its publication. The research projects sponsored by the Research Commission of the Association afforded excellent matter for THE JOURNAL; the research articles led to the organization of local study clubs and a spreading development of interest and production. In his presidential address in 1920, Dr. John V. Conzett said: "Much of the progress that the profession has made in the past few years has been largely due to the influence of this splendid publication." The establishment of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION has proved to be the outstanding development in dental journalism in the twentieth century.

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, now in its fortieth volume, symbolizes to every member of the Association the excellent standing of dentistry as a health profession. Through the years since 1913, THE JOURNAL has contributed, directly and indirectly, a great deal to the progress of the profession: it has aided vitally in promoting the best interests of the practitioner; it has demonstrated dentistry's ability to maintain its own publication; it has played an important role in the development of medicine's greatly improved attitude toward dentistry and in the building of effective public relations. It has served the profession well in all the ways that an official journal could serve the members of an association with a wide range of reader interests.

State and Local Periodicals.—Prior to the reorganization of the National Dental Association and the concomitant tremendous growths in the memberships of state and local societies, the direct participation of the component groups in dental journalism had been almost negligible as regards either quality or quantity. But the development of a strong independent national journal furnished an inspirational example for the inauguration of state, district and local bulletins and journals. The elimination of the proprietary journals that had customarily handled their proceedings also was an important contributory factor in the decision of the local societies to publish their own periodicals. The discovery that advertising could be made to pay a large percentage of the costs of the publication has been another weighty incentive. The study sponsored by the American College of Dentists (1928-1931) listed 63 publications of professional dental societies. The report of Dr. J. C. Black, in 1941, listed 73.

At the present time 35 states are represented by periodicals supported by their state dental society. A few of these are full fledged journals; others are merely bulletins. Most of these state periodicals originated between 1910 and 1925.

Regional Journals.—For many years the regional journal has been a leading subject of discussion at the annual meetings of the American Association of Dental Editors. The Association has advocated the regional, or sectional, type of journal as a major objective of its program to improve the standards of the profession's journalism.

An example of a regional journal has existed for many years in *North-West Dentistry,* which represents Minnesota, North Dakota and South Dakota. The regional journal idea has been realized in the publication of the *New England Dental Journal,* the first number of

which was issued in January 1948. As the official publication of the six New England state dental societies it has an exceptionally good opportunity to exemplify the benefits that would naturally be derived from the venture.

School Publications.—The earliest periodical published by a dental school was probably the *Dental Times* issued by the Pennsylvania College of Dental Surgery from 1863 to 1873. A number of schools also sponsored periodicals in the last decade of the nineteenth century and early in the twentieth century.

The majority of school periodicals, however, are of comparatively recent origin. Their development is perhaps a consequence of the increased admission and graduation requirements in dental education and of the improved curriculum. The *Bur* and the *Pen Dental Journal* are notable for both the remarkable length of their careers and for their accomplishments.

The Fraternity Group.—Several dental fraternities and fraternal organizations have sponsored dental journals. These date back to the nineteenth or to the early decades of the twentieth century.

Journals of the Dental Specialties.—Prior to 1901 there were indications that "specialties" in dentistry were forthcoming in the not too distant future. Oral surgery, previously a part of general practice, was the first specialty to be recognized—a lectureship in surgery having been established in 1870. Orthodontics was recommended as a specialty as early as 1890. The efforts to develop dental specialties led to the obvious need—publications through which the specialties could be kept informed of the rapidly expanding scientific fronts.

Journal of Dental Research.—The founding of the *Journal of Dental Research* by Dr. William J. Gies in 1919 ranks as one of the three most important developments in dental journalism during the twentieth century. A monument to the ideals and the devotion of its founder, it has made highly significant contributions to the progress of dentistry. Throughout its almost 29 years of rendering an indispensable service to the profession, this journal has achieved universal recognition as the journalistic medium for the publication of dentistry's most valuable scientific contributions. As the official publication of the International Association for Dental Research, founded in 1920, it has had a profound effect on the activities of that admirable organization and its many sections. The present status of dentistry as a scientific profession owes much to the profession's excellent research journal, which has always been edited and published in the highest traditions of professional journalism.

American Journal of Orthodontics.—The current *American Journal of Orthodontics* has had a long and varied career. It began as the *International Journal of Orthodontia* in January 1915, and has been published by the C. V. Mosby Company since its inception. In March 1919 the name of the publication was changed to the *International Journal of Orthodontia and Oral Surgery.*

In January 1922 the American Society of Dental Radiographers adopted its constitution and bylaws. The membership fee included a subscription to the official publication of the Society to begin in January 1923. It was voted that the *International Journal of Orthodontia and Oral Surgery* should be the official publication. This action caused the February 1922 issue to become the first issue of the *International Journal of Orthodontia, Oral Surgery and Radiography.* Beginning with January 1933 the publication was called the *International Journal of Orthodontia and Dentistry for Children.*

Children's dentistry as a topic of publication in this journal was short lived.

Beginning with the first issue in 1936, the journal became the *International Journal of Orthodontia and Oral Surgery*. The department of children's dentistry was dropped because "Such a department, while highly meritorious, is difficult to operate on an economically sound basis."

In January 1938 the journal became the *American Journal of Orthodontics and Oral Surgery*. It was believed that the change in name was appropriate because of the close relation between the journal and the newly founded American Association of Orthodontists. Furthermore, the journal was designated as the official publication of the Association.

January 1948 saw another change. The *American Journal of Orthodontics and Oral Surgery*, as such, was discontinued. In its place, two separate journals were issued. One was called the *American Journal of Orthodontics;* the other, the *Journal of Oral Surgery, Oral Medicine and Oral Pathology*. There were two reasons for the decision to publish two journals instead of one: a poll taken by the publishers showed it to be feasible to publish a journal that dealt exclusively with the science of orthodontics; there was the need for a single journal to serve as the official publication for the New England Society of Oral Surgery, the Seminar of Dental Medicine and the American Academy of Oral Pathology.

Currently, the *American Journal of Orthodontics* is the official publication for the American Association of Orthodontists, its component societies and the American Board of Orthodontics. The *Journal of Oral Surgery, Oral Medicine and Oral Pathology* serves as the official publication not only for the organizations represented by the inception of the journal but also for the American Association of Endodontists.

American Orthodontist.—The Society of Orthodontists, whose membership consisted of graduates of the Angle School of Orthodontia, held its first meeting in June 1900. This Society had no publication that can be called a journal. As a result of intrinsic differences in the Society, Dr. Angle and some of his close associates resigned in 1905 and formed the Alumni Society of the Angle School of Orthodontia in 1906. This organization continued until 1913.

During the brief period of existence of the Alumni Society, the *American Orthodontist* was the official publication of the Society. The first issue was published in 1907; the last in 1912. The Alumni Society and the *American Orthodontist* showed the strong influence of their founder, Dr. Edward H. Angle.

Angle Orthodontist.—The *Angle Orthodontist* is "a magazine established by the co-workers of Edward H. Angle, in his memory. . . ." It began publication in January 1931, and has appeared regularly as a quarterly journal except for an interval during World War II when the issues were combined and published semiannually. It is the official publication of the Edward H. Angle Society of Orthodontia which held its first annual meeting in June 1922.

Journal of Periodontology.—The American Academy of Periodontology which publishes the *Journal of Periodontology* was organized in 1914 as the American Academy of Oral Prophylaxis and Periodontology. The current name for the Academy became effective in 1919. This group recognized the need for a publication as early as 1915, when the president of the Academy made a recommendation for a journal. This recommendation did not produce a journal; it produced bulletins that were scarcely more than program announcements.

The first issue of the *Journal of Periodontology* appeared in January 1930. However, the second issue of the first volume was not published. Since 1931 the *Journal of Periodontology* has appeared regularly, being published semi-

annually until 1945 and quarterly thereafter.

Journal of Endodontia.—The first regular meeting of the American Association of Endodontists was held in 1944; the second in 1946. At this second meeting one of the objectives of the association was the establishment of "an official publication of our association, or a Journal of Endodontia, as soon as practical." The first issue of the *Journal of Endodontia* was published in March 1946. The American Association of Endodontists felt that its official publication was not meeting with the success anticipated only three years previously; thus the *Journal of Endodontia* ceased publication with the last issue in 1948. However, the Association had made previous arrangements with the *Journal of Oral Surgery, Oral Medicine and Oral Pathology* for the inclusion of pertinent information about endodontics. In January 1949 this journal became the official publication of the American Association of Endodontists.

Journal of Dental Medicine.—The American Academy of Dental Medicine, the sponsor of the *Journal of Dental Medicine,* was established in New York City in 1946. In October of that year the first issue of the journal, a quarterly, was published. The objectives of the Academy are:

> to promote the study and dissemination of knowledge of the cause, prevention and control of the diseases of the teeth, their supporting structure and adnexa and related subjects; and to foster and promote a better scientific understanding between the fields of dentistry and medicine.

Journal of Dentistry for Children.—A chain of events which began in 1925 and was activated by the leading exponents of a specialty of dentistry for children resulted in the organization in 1927 of the American Society for the Promotion of Dentistry for Children. Shortly after the foundation of the Society, the *Bulletin* was issued to the members. These mimeographed pages served more as a medium of communication than as an official organ of the Society. They were issued until the Society began the publication of the *Review of Dentistry for Children* in 1933.

As a result of the action taken at the fourteenth annual meeting of the Society, the name of the official publication was changed to the *Journal of Dentistry for Children,* and the name of the society that sponsored it was changed to the American Society of Dentistry for Children. The quarterly publication is published "to serve the advancement of dentistry for children and to facilitate and encourage its practice by private dentists and by the public health institutions and agencies."

Archives of Clinical Oral Pathology.—As a result of a conference on bone tumors held at Baltimore, Maryland, in 1932, a group of dental and medical practitioners agreed that there was a need for a wider, organized study of the pathologic conditions of the oral cavity. Consequently, the New York Institute of Clinical Oral Pathology was established.

The first issue of the *Archives of Clinical Oral Pathology* appeared in March 1937. The publication was made possible through a grant from the Martha M. Hall Foundation. The *Archives* was issued quarterly until the end of 1940, when the Institute discontinued its publication in favor of the *Journal of Oral Surgery* that was being advocated by the American Dental Association and the American Association of Oral Surgeons and Exodontists.

Journal of Oral Surgery.—The publication of the *Journal of Oral Surgery* is significant because it is the only specialty dental journal published by the American Dental Association. This publication reveals a willingness on the part of organized dentistry to encourage and to aid the dental specialties and their expanding literature. The idea of a publication

Journal of Oral Surgery; a journal devoted to the art and science of oral surgery. The publication of the Journal of Oral Surgery is significant because it is the only specialty dental journal published by the American Dental Association. This publication reveals a willingness on the part of organized dentistry to encourage and aid the dental specialities and their expanding literature.

concerned primarily with oral surgery developed through the initial activities of the American Association of Oral Surgeons and Exodontists.

The American Association of Oral Surgeons and Exodontists appointed a committee in 1935 to investigate the possibilities of a publication to replace the *Bulletin*, which from its first issue in 1928 had made sporadic and infrequent appearances. In January 1943 the *Journal of Oral Surgery* became a reality. It culminated years of effort and presented the profession with a journal to replace bulletins which contained barely more than program announcements. This journal, which is published quarterly, has lived up to the expectations expressed in the preliminary announcement.

The Journal of Oral Surgery will present original manuscripts on the subject of oral surgery, including pathology, oral diagnosis, operative procedures and selected surgical, medical and therapeutic subjects. Special departments will be devoted to case reports, abstracts, book reviews and society meetings and programs.

Although the new journal will be devoted exclusively to oral surgery, it will by no means be exclusively an oral surgeons' publication as it is the intention of the editorial board to select and publish practical, well-selected articles that will be beneficial to the general practitioner of dentistry as well as the specialist.

Journal of Oral Surgery, Oral Medicine and Oral Pathology.—The youngest of the specialty journals is the *Journal of Oral Surgery, Oral Medicine and Oral Pathology* which began as a monthly publication in January 1948. This journal is the result of the efforts of three organizations, the New England Society for Oral Surgery, the Seminar of Dental Medicine and the American Academy of Oral Pathology. The *Journal* has been designated as the official publication of the organizations that were instrumental in its development. Since 1949 it has also been designated as the official publication of the American Academy of Endodontists, whose *Journal of Endodontia* was suspended after three years.

Journal of Dental Education.—Prior

to 1936 it was decided by the American Association of Dental Schools that a *Journal of Dental Education* should be published. The first issue of the *Journal* was published in October 1936. It contained the statements that

> The Journal of Dental Education was established as a medium for the publication of articles and information on dental education and related fields. It is to provide opportunity for expression on the part of dental teachers and others interested in dental education. The Journal will fulfil its function and grow in value depending upon the degree with which its pages are utilized in the advancement of dental education.

This publication is owned and published by the American Association of Dental Schools. The *Journal* is issued quarterly and presents to the readers a range of information that encompasses all phases of dental education.—*Gardner P. H. Foley, M.A. and Marion W. McCrea, D.D.S.*

BOOK LITERATURE

During the first two decades of the twentieth century, the United States stood third among the nations of the world in the production of dental books, having published in those 20 years 362 works. For the later decades of the half century, no accurate statistics have been published; but it is altogether likely that the publication of this nation within the third decade overtook that of her nearest rival, France, and that by the fifth decade it surpassed even the enormous production of Germany.

The present historical survey of dental book literature in the first half of the twentieth century is based upon a selection of about 200 of the representative works which were reviewed in the dental journals during that period. Consideration of dental dictionaries, histories, bibliographies and books on dental ethics and economics has been omitted.

Revision of Older Works

Eighteen significant dental books that were first issued before 1900 survived in the form of subsequent publication after that date. Of these, 10 were first published in the later nineties, and therefore might be expected to persist at least through the next decade. The rest were of earlier origin. Their persistence cannot be accounted as either accident or the usual fate of mediocre productions. The earliest is Chapin A. Harris's celebrated *Principles and Practice of Dental Surgery* which originated (as *The Dental Art*) in 1839, reached seven distinct editions before the author's death in 1860, and achieved six more editions under two successive editors, the thirteenth edition (1897) being reprinted as late as 1912. One book by Richardson was first published in 1860.

The surviving books first issued in the eighties were Charles J. Essig's *Manual of Dental Metallurgy* (1882), Ferdinand J. S. Gorgas' *Dental Medicine* (1883), L. P. Haskell's *Students' Manual and Hand-Book for the Dental Laboratory* (1887), George Evans' *Practical Treatise on Artificial Crown and Bridge Work* (1888), Eugene S. Talbot's *Irregularities of the Teeth* (1888), and S. H. Guilford's *Orthodontia* (1889).

The works that achieved the greatest longevity in this group of 18 were Harris's *Principles and Practice of Dental Surgery* (74 years), *The American Textbook of Operative Dentistry* (50 years to date), *The American Text Book of Prosthetic Dentistry* (47 years), Hodgen's

Dental Metallurgy (43 years), and Richardson's *Practical Treatise on Mechanical Dentistry* (44 years).

While some of these early works enjoyed a longevity extending to nearly half a century or longer, other outstanding books failed to cross the century line. Notable among these were James E. Garretson's *System of Oral Surgery,* first published in 1869 (under another title), and appearing for the last time in 1898. Norman W. Kingsley's *Oral Deformities* was published only once, in 1880. Taft's *Operative Dentistry* appeared in several editions from 1859 to 1883. Litch's *American System of Dentistry* (1886, 1887) was published only once, as was J. N. Farrar's *Irregularities of the Teeth* (1888, 1891). The same is true of W. D. Miller's epoch-making *Microorganisms of the Human Mouth* (1890).

One of the requisites of a book to attain a long life appears to be that it should make a good textbook. Farrar's and Litch's works were too massive for republication. Miller's was a monograph. The demise of Garretson's, Taft's and Kingsley's books before the turn of the century is not so easily explained.

In the case of *The American Textbook of Operative Dentistry* and of the *American Text Book of Prosthetic Dentistry,* there is little continuity in the succeeding editions; and essentially new works were produced under the old title. This is shown by the fact that the contributors changed throughout the years, and none of the earlier collaborators are to be found in the later editions.

In works by a single author, revision in the name of the original writer is somewhat more difficult, as the editor is under compulsion to retain something to justify the ascription of authorship. A cursory comparison of Harris's 1858 edition with that of Gorgas (1897) shows that in view of the immense changes that had taken place, the original author's words could be retained only in commonplaces and unimportant generalities, and that the revised work was hardly a composite of Harris's views with those of his editors.

Representative Books Since 1900

To look back on the first decade and select the most significant dental books of that period is an easy task. The outstanding contributions are unquestionably G. V. Black's *Operative Dentistry* (1908) and E. H. Angle's *Malocclusion of the Teeth* (1900). In justification of the inclusion of Angle's book in this period, it must be pointed out that, although the author regarded the edition of 1900 as the sixth, the preceding five editions were not at all comparable in scope with the so-called sixth and seventh and constituted, in fact, a mere fragment of the complete work.

When the second decade is viewed, the choice becomes more difficult, and it continues to become progessively more difficult as the present time is approached. In this second period, several works, either because of their intrinsic value, their original treatment of the subject, or their pioneering spirit, are especially deserving of mention. In the field of dental histology are F. B. Noyes' *Text-book of Dental Histology and Embryology* (1912) and A. Hopewell-Smith's *Normal and Pathological Histology of the Mouth* (1914), if this can be considered a work of American scholarship. Aside from Broomell's work (1898), these were the first notable American works in the histological field. G. V. Black's *Special Dental Pathology* (1915) was the first large work devoted to diseases of the soft tissues of the teeth. George H. Wilson's *Manual of Dental Prosthesis* (1912) was immensely influential. J. H. Prothero's large volume, *Dental Prosthetics,* also appeared in this decade (1916). Some special works in practically new phases of dentistry, to be discussed later, should also be included.

The third, fourth, and fifth decades of the century are largely characterized by

books devoted to the subbranches into which the established divisions of dentistry fall. In these later periods it would be hazardous to choose a few works as the most significant. A discussion of the trend toward specialization will reveal some of the more interesting developments and books of these decades.

Types of Books Before and Since 1900

Decline of General Works on Dentistry.—In general, the development of dental books during the first half of the twentieth century has been from comprehentive works to more specialized works. Already by 1900, the type of general dentistry, covering all phases of the professional activities, had very largely ceased to be published. Harris's *Principles and Practice of Dental Surgery* was the only notable exception. In recent years, the only books with a comprehensive scope have been compends intended for state board reviews or the like, and the *Year Book of Dentistry,* which has more the temporary character of a periodical than of a book proper.

Until the last two decades, most of the important works corresponded in scope to the various departments or branches of dentistry. The longer established departments, such as prosthetics, operative dentistry, orthodontia, pathology and oral surgery, had been represented even before 1900 by outstanding books. Entirely new comprehensive books in some of these departments practically ceased after the first decade, as for instance, in operative dentistry. Only W. H. O. McGehee's *Textbook of Operative Dentistry* (1930) appeared as a wholly new work since 1911. All the complete and outstanding works on operative dentistry, except McGehee's, were published originally in the first decade. Kirk's *American Text Book* continued in new editions as a survival from the preceding century, and Black's (1908), Johnson's (1900), Marshall's (1901), and Davis's (1911) books on operative dentistry appeared for the first time.

The case of books on orthodontia is somewhat different. In orthodontia, as in operative dentistry, the first decade of the century marked a burst of publication with the works of Jackson, Case, Lischer and Angle. But unlike the case of operative dentistry, the publication of orthodontic works continued throughout the half century. Not only did Case and Lischer appear in later editions, but there were new important works, some of which had several editions. Martin Dewey's *Practical Orthodontia* (1915), later edited and finally rewritten by G. M. Anderson, reached a seventh edition in 1948. McCoy's *Applied Orthodontia* (first edition, 1922; sixth edition, 1946), Strang's *Textbook of Orthodontia* (first edition, 1933; second edition, 1943), and Salzmann's *Principles of Orthodontia* (1943) should be mentioned.

Specialized Works.—Branches of dentistry recognized more recently, such as roentgenology, periodontics, pedodontics, oral diagnosis, oral medicine, endodontics, exodontics and public health dentistry, began to be given representation in complete volumes in the later decades.

Roentgenology was represented by the pioneer work of Raper, in his *Elementary and Dental Radiography* (1913). In the same decade came the first editions of McCoy, Thoma and Ivy, and at later times Simpson, Pollia and Ennis.

Although for local anesthesia, dentistry for many years relied on Riethmuller's translation of Guido Fischer (1912), an American account was published by Kurt Thoma in 1914. Nevin and Puterbaugh's *Conduction, Infiltration and General Anesthesia in Dentistry* appeared in 1924 and reached a fifth edition in 1948. Seldin's *Practical Anesthesia for Dental and Oral Surgery,* first published in 1934, has been revised to 1947.

In the field of dental materia medica and therapeutics, the favorite work of

the profession in the early years was Gorgas' *Dental Medicine* which was still used as late as 1912 in an eighth edition. The best known books in this field during the first half of the twentieth century were the books by Hermann Prinz (first edition, 1909; ninth edition, 1945), and by J. P. Buckley (first edition, 1909; fifth edition, 1926). More recently W. H. O. McGehee's *Textbook of Dental Pharmacology* (1936) is available in a third edition, 1947.

Since Talbot's pioneer work on *Interstitial Gingivitis* (1899) the periodontal diseases have been dealt with in the more comprehensive pathologies such as Black's *Special Dental Pathology* (1915). *The Clinical Periodontia* of P. R. Stillman and J. O. McCall (1922), not only is one of the earliest books on the subject in the twentieth century, but marks the beginning of a new era in the etiology and treatment of the disease. Since then, three notable contributions to the subject are Merritt's *Periodontal Disease* (first edition, 1930; third edition, 1945), S. C. Miller's *Textbook of Periodontia* (1938 and 1943) and H. M. Goldman's *Periodontia* (1942 and 1949).

Pedodontia began to be represented in book literature in the third decade by M. Evangeline Jordon's *Operative Dentistry for Children* (1925) and F. E. Hogeboom's *Practical Pedodontia or Juvenile Dentistry* (1924). The latter work, which reached its fifth edition in 1946, now shares the field of dentistry for children with two other works; namely, W. C. McBride's *Juvenile Dentistry* (first edition, 1932; fourth, 1945) and J. C. Brauer's *Dentistry for Children* (first edition, 1939; second, 1947).

The subject of dental materials was partly covered by the early works on metallurgy of Essig (1882) and Hodgen (1896), with later revisions. E. W. Skinner's *Science of Dental Materials* (1936) was the first adequate treatment of the whole subject. Shell's revision of the Hodgen text (1938) expanded the content of that work with the title *Dental Materials*. Wilmer Souder and G. C. Paffenbarger in *Physical Properties of Dental Materials* (1942) summarized the work of the National Bureau of Standards on all materials involved.

Oral diagnosis is a phase of dental education rather than a branch of dental practice. The stress placed on this subject by educators in the fourth decade, and especially by the Curriculum Survey Committee (1935), was responsible for the appearance of S. C. Miller's *Oral Diagnosis and Treatment* and Kurt H. Thoma's *Oral Diagnosis and Treatment Planning*, both in 1936.

From the beginning of formal dental education in schools, the background of medicine and the borderline interests of the dentist with those of the physician have been a subject of study. T. E. Bond, one of the founders of the first dental school, in 1851 published a work dealing with the subject matter of his course in Baltimore College, which he entitled *Dental Medicine*. For some years it remained the text for this field; but as the education became more engrossed in technical dentistry, this subject became less and less conspicuous in the curriculum, and was ignored in American dental book publication. Only with the more recent interest in biological relations of dentistry has adequate attention been given to the medical aspects. In 1938 appeared the first edition of Comroe, Collins and Crane's *Internal Medicine in Dental Practice* (third edition, 1949). L. W. Burket's *Oral Medicine: Diagnosis and Treatment* (1946) attempts to fulfill the needs of the profession and student in this regard.

Pulp disease and its sequelae, long included in the general dental pathologies as well as in some of the operative dentistries, has been left for exclusive treatment in dental books to the last decade. E. D. Coolidge contributed *Clinical Pathology and Treatment of Dental Pulp and Periodontal Tissues* in 1939; and L. I.

Grossman published *Root Canal Therapy* in 1940. Both works have revised editions in 1946.

Literature on oral hygiene and preventive dentistry marks one of the oldest interests of professional dentistry. After the turn of the century, a clearly defined trend in this direction began to manifest itself. This was initiated with Robin Adair's *Practical Oral Hygiene* (1914). The works of A. C. Fones, especially the textbook on *Mouth Hygiene* (1918) which he edited and which went through several editions, are characteristic of this activity. The public health phases were for some time represented only by J. A. Salzmann's *Principles and Practice of Public Health Dentistry* (1937) and J. O. McCall's *Fundamentals of Dentistry in Medicine and Public Health* (1939). Recently, however, has appeared W. J. Pelton and J. M. Wisan's *Dentistry in Public Health* (1949).

One characteristic of the last decade which should be noted is the proportionately great emphasis on phases of oral disease and treatment with which the dentist usually has little to do. Oral surgery represented by substantial works by such men as Thoma, Mead, Kazanjian, Ivy and others, as well as oral pathologies by the same or equally distinguished authors have crowded the last few years. At the same time works on distinctly dental subjects have been relatively less numerous and imposing.

There has been a tendency for more and more specialized works to appear dealing, not with whole branches of dentistry, but with very limited fields and problems. Among the early works of this character was Miller's *Microorganisms* (1890). In the third decade George Winter's book on the impacted third molar (1926) still stands as one of the largest and most intensive works devoted to a very specialized subject.

Some of these more highly specialized books on dental and oral subjects are: Raper, *Electro-Radiographic Diagnosis* (1921); Gillett and Irving, *Gold Inlays by the Indirect Method* (1932); Hirschfeld, *Toothbrush: Its Use and Abuse* (1939); Oliver, Irish and Wood, *Labio-Lingual Technic* (1940); Spencer, *Prevention of Malocclusion* (1941); Ryan, *Psychologic Foundations in Dentistry* (1946); Ellis, *Classification and Treatment of Injuries to the Teeth of Children* (1946); Tylman and Peyton, *Acrylics and Other Dental Resins* (1946); Leicester, *Biochemistry of the Teeth* (1949).

Most of these specialized works obviously fall in the last decade and indicate one of the most recent trends in writing of dental books.

Works Other Than Textbooks.—Most of the outstanding books of dentistry have been textbooks. This fact is understandable, since works of this character are bound to have the largest body of readers and consequently to be most profitable to the publisher. Most of the highly specialized works afore-mentioned could not be considered in any sense textbooks. Also a few works that are more general fall into this category. An example is S. M. Gordon's *Dental Science and Dental Art* (1938).

Present and Future Needs

It is necessary that the everyday needs of the dental student and practitioner be met in the future as in the past, by textbooks keeping the profession abreast of advances in standard knowledge and technic. However, there is probably no one development in the literature that would do more to indicate scientific and cultural progress of the profession than the increased publication of books dealing with highly specialized problems of dentistry, written for the mature and thoughtful dentist.

At the present time such an undertaking, probably, cannot be accomplished altogether through the enterprise of the

commercial publisher, since the market for such publication is not sufficiently great and certain. Universities, many of which now publish scholarly and scientific works that are unmarketable, should be induced to give a fair share of their funds for this purpose to the publication of high grade work in the dental field. Other institutions, foundations and funds could likewise, perhaps, be persuaded to invest sums in such commendable contributions to the more fundamental problems of dentistry.—*George B. Denton, Ph.D.*

USE OF THE LITERATURE

For many years nothing much was done toward making the professional literature accessible to dentists and dental students beyond offering books on the market and distributing journals by subscription. To make the literature available libraries and bibliographies were necessary. Libraries were mostly the accomplishment of the last 25 years; dental bibliography had some beginnings during the latter years of the nineteenth century.

The Dental Index

The earliest attempt to index the periodical dental literature was made by Dr. Jonathan Taft in 1886 while he was editor of the *Dental Register*. His *Index* covering the period 1839-1885, although not complete, proved very useful. Nothing comparable appeared until well into the twentieth century.

The 18 volumes of the *Index to Dental Literature* constitute one of the three outstanding developments in dental literature during the twentieth century. In fact, the *Index* may be justifiably described as one of the great contributions to the progress of dentistry.

The idea of the *Index* was conceived by Dr. Arthur D. Black in 1897, 24 years before the publication of the first volume. Dr. Black, realizing the great handicap imposed upon the profession by the lack of a medium for listing its literary works for ready reference, worked out a plan for the classification of dental subjects which was a modification of the Dewey system. In 1908 the Institute of Dental Pedagogics appointed a committee to organize a dental index bureau and to devise ways and means of carrying out the proposed work of indexing the dental literature. The first volume, covering the literature of 1911-1915, was published in 1921 by the Dental Index Bureau under the auspices of the American Institute of Dental Teachers. The second volume (1916-1920), published in 1922, contained a bibliography of dental bibliographies by Dr. Andres G. Weber. With the third volume (1921-1923) the American Dental Association became one of the sponsors. The eleventh volume (1927-1929), published in 1932, has a supplementary value because of the presence of Dr. Edward Mills' authoritative "Bibliography of Dental Society Proceedings, Transactions and Publications."

The first 15 volumes of the *Index* were compiled by Dr. Black. After his death in 1937, the details of indexing and publishing came under the supervision of the Committee on Library and Indexing Service of the American Dental Association. This committee made many valuable changes in the *Index*. The old system of listing works according to Dr. Black's classification of subjects and of devoting a separate section to authors was discarded in favor of the unified dictionary method of presentation, with subject and author entries arranged alphabetically. Another notable improvement

was made in the listing of publications whereby the names of all magazines were presented in their proper sequence. The latest volume covers 1945-1947.

Plans for 1950 call for an *Index* that will "appear in quarterly cumulation as a bound volume."

The benefits accruing to dentistry from the *Index* are manifold. It perpetuates the value of every listed contribution. It has had a profound influence on the development of the dental libraries by affording them a classified subject index for dentistry and providing them with a repository of information upon which to build their most important services. To the investigator the *Index* represents a medium for checking the developments in all phases of dentistry. It has been the means of reducing duplication of scientific and literary efforts. The great improvement in the citing of references by dental writers during the last 25 years stems from the fact that the *Index* has made bibliographical information easily accessible. The *Index to Dental Literature* forms a carefully prepared guide to dentistry's progress and is an essential element in that progress.

The book literature has not been so well cared for bibliographically as has the periodical literature. The earliest attempt to list the output of dental books in the United States was made by C. George Crowley in his *Dental Bibliography*, which aimed to include every book in dentistry published in the world from 1536 to 1885. In 1949 J. Menzies Campbell published a small volume, *A Dental Bibliography*, which lists the British and American publications to 1880. The greatest need in dental bibliography is an exhaustive bibliography of dental books published from 1880 to 1950.

The Dental Libraries

In 1901, although there were several libraries with good collections of dental books, no good working libraries existed. The situation had not received much attention by 1916, for in that year the editor of the *International Journal of Orthodontia* commented:

> The college library is generally given a place in the private office of some individual —the dean or secretary of the school—and carefully guarded from the eyes and hands of the student. Consequently, so far as the student body is concerned, the library in a dental college is practically of no value. There are few schools that make an attempt to procure a library for the benefit of the students . . .
>
> While we realize that the question of a dental library in the dental colleges is a rather new phase of education, it is nevertheless a feature of educational work that must be considered, and the future of dental education depends to a certain extent on a properly selected reference library that is accessible to the student.

In 1926 Dr. Gies urged the "creation of adequate library facilities now conspicuously absent from most dental schools."

The "Requirements for the Approval of a Dental School," adopted in October 1940 by the Council on Dental Education, reveals a greatly accelerated interest in the libraries by dental educators:

> The Council regards adequate library facilities an essential in any program of dental education. The enlarging content of the curriculum, the encouragement of independent study, and the demands of research create a continuous need for the accumulation and the intelligent use of the printed resources of dentistry and its related sciences.

In many schools the installation in recent years of regularly scheduled lectures on the use of the library and of formal courses in writing has had remarkable effects on the circulations of the libraries. Such a program, covering the four years of study, has in some measure developed in the student a predilection for independent reading or browsing in the literature. As graduates these men are intelligent and habitual readers of dental journals. Their presence in the profession may be expected to have far-reaching effects on the quality of the profession's literature.—*Gardner P. H. Foley, M.A.*

ANNOUNCEMENTS

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama			G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Alaska	Aug. 2-4	Anchorage	C. N. Hoveland	Anchorage
Arizona			H. G. DeWolf	Valley National Bank Bldg., Tucson
Arkansas			D. M. Hamm	White Bldg., Clarksville
California	April 16-18, 1951	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	April 2-4, 1951	Los Angeles	C. A. Moss	1401 S. Hope St., Los Angeles
Colorado	Oct. 4-7	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut			E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			L. Kreshtool	815 West St., Wilmington
D. of Columbia			K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Nov. 19-22	Hollywood	L. M. Schulstad	Professional Bldg., Bradenton
Georgia	Oct. 8-11	Atlanta	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	Oct 12-14	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	June 26-28	McCall	A. R. Cutler	Eastman Bldg., Boise
Illinois			P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana			E. E. Ewbank	Kingman
Iowa			H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas			F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	April 2-4, 1951	Louisville	A. B. Coxwell	1976 Douglass Blvd., Louisville
Louisiana	April 26-28, 1951	New Orleans	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 22-24	Belgrade Lakes	F. P. Gilley	31 Central St., Bangor
Maryland			E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts			H. E. Tingley	12 Bay State Road, Boston
Michigan	April 16-18, 1951	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 19-21, 1951	Minneapolis	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 18-21	Biloxi	F. C. Sneed	Onyka
Missouri			R. R. Rhoades	201 Merchants Bank Bldg., Jefferson City
Montana			C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska			F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada			C. A. Paice	Boggs Bldg., Las Vegas
New Hampshire	June 18-20	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey			J. G. Carr	407 Cooper St., Camden
New Mexico			J. S. Eilar	First National Bank Bldg., Albuquerque
New York	June 5-8	New York	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina			R. F. Hunt	Rose Drug Co. Bldg., Rocky Mount
North Dakota			A. L. Smeby	Northwood
Ohio	Nov. 27-29	Cincinnati	E. G. Jones	185 E. State St., Columbus
Oklahoma	April 15-18, 1951	Oklahoma City	R. C. Calkin	109½ W. Oklahoma, Guthrie
Oregon			H. C. Fixott, Jr.	Medical-Dental Bldg., Portland
Panama Canal Zone			L. F. Baranowski	P. O. Box 102, Ft. Kobbe
Pennsylvania	June 18	Bedford Springs	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	July 16-17		J. F. Suarez	Box 3863, Santurce
Rhode Island	Jan., 1951	Providence	A. F. Sullivan	171 Westminster St., Providence 3
South Carolina			J. R. Owings	201 E. North St., Greenville
South Dakota			E. W. Elmen	Sioux Falls
Tennessee			E. J. Justis	Exchange Bldg., Memphis
Texas			W. Ogle	310 N. Ervay St., Dallas
Utah			B. F. McBride	Medical Arts Bldg., Salt Lake City
Vermont			J. A. Larrow	Middlebury
Virginia			J. E. John	804 Medical Arts Bldg., Roanoke
Washington			F. J. Dingler	1502 Medical-Dental Bldg., Seattle 1
West Virginia			A. B. Drake	Huntington

State	Date	Place	Secretary	Address
Wisconsin	Mar. 27-29, 1951	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming	June 22-24	Cheyenne	T. A. Ward	326 Wyoming National Bank Bldg., Casper

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 19	Birmingham	M. D. Edwards	120 Adams, Montgomery
Arizona	June 21-24		R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 19-22*	Little Rock	H. E. Hanna	Wilson Bldg., El Dorado
California	June 12	Los Angeles	K. I. Nesbitt	507 Polk St., San Francisco 2
	July 24	San Francisco		
Colorado	June 19-23	Denver	W. D. McCarthy	724 Republic Bldg., Denver 2
Connecticut	June 20-24*	Hartford	C. G. Brooks Recorder	302 State St., New London
Delaware	June 28-30	Wilmington	P. K. Musselman	143 W. Main St., Newark
D. of Columbia	June 5-9	Washington	J. R. Palkin	1835 Eye St., N. W., Washington
Florida	July 10-15*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			R. C. Coleman	State Capitol Bldg., Atlanta 3
Hawaii	Aug. 30-Sept. 4*	Honolulu	H. L. Houvener	7-8 Pantheon Bldg., Honolulu
Idaho	Aug. 1	Boise	F. L. Luce	510 First National Bank Bldg., Boise
Illinois	June 27-30	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana	June 13-16*	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	June 5-9	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	June 7-8, 11-12	Kansas City, Mo.	G. L. Teall	Hiawatha
Kentucky	June 19-22	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana	May 29-June 2	New Orleans	A. R. deNux	Marksville
Maine	June 26-27	Augusta	R. A. Derbyshire	Box 387, Skowhegan
Maryland			W. D. Day	3811 Hadley Square E. Baltimore 18
Massachusetts	June 19-23†	Boston	J. C. Wilson	413 N. State House, Boston 33
	June 21-23‡			
Michigan	June 11-17	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota	June 12-16	Minneapolis	F. A. Larson	1632 Washington St., N. E., Minneapolis
Mississippi	June 26-28	Jackson	J. C. Boswell	508 Lamar Bldg., Jackson
Missouri	June 5, 6, 9, 10	Kansas City, Mo.	R. R. Rhoades	Central Trust Bldg., Jefferson City
	June 7, 10	St. Louis		
Montana	July 10-13	Helena	T. C. Betzner	301 Power Bldg., Helena
Nebraska	June 2-3**	Lincoln	C. A. Bumstead	924 Stewart Bldg., Lincoln
	June 8-10§	Lincoln		
	June 12-14§	Omaha		
Nevada	June 5, Dec. 4	Reno	G. C. Steinmiller	Masonic Temple, Reno
New Hampshire	June 29-30		J. B. Brown	5 N. State St., Concord
New Jersey	June 5-9†		W. A. Wilson	150 E. State St., Trenton 8
	June 5-6‡			
New Mexico	June 26-29	Santa Fe	J. J. Clarke, Sr.	Artesia
New York	June 23-24 and Sept. 29-30§†	New York and Buffalo	D. W. Beier	23 S. Pearl St., Albany 7
	June 27-30 and Oct. 3-6**†	New York, Buffalo, Syracuse and Albany		
	June 24§‡	New York, Rochester and Buffalo		
	Sept. 30§‡	New York and Buffalo		
	June 27-28 and Oct. 3-4**‡	New York and Buffalo		
North Carolina	June 26	Raleigh	F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 9-13*	Fargo	W. J. Ford	Fargo
Ohio	June 26-July 1	Columbus	E. D. Lowry	79 E. State St., Columbus
Oklahoma	June 14-16	Oklahoma City	N. D. Griffith	509 Medical Arts Bldg., Oklahoma City 2

Name	Date	City	Secretary	Address
Oregon	June 19-22*	Portland	A. F. Davis, Exec. Secy.	306 Public Service Bldg., Portland
Pennsylvania	June 19-24† June 19-22‡	Philadelphia and Pittsburgh	R. E. V. Miller	Northampton National Bank Bldg., Easton
Rhode Island			F. M. Hackett	State Office Bldg., Providence
South Carolina	July 6-8	Columbia	E. G. Bumgardner	1517 Hampton St., Columbia
South Dakota	June 18-21	Sioux Falls	R. W. Ellis	Salem
Tennessee	June 12-15	Memphis	F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas	June 18-23	Dallas	R. T. Weber	312 Capital National Bank Bldg., Austin
Utah	June 26		J. J. Dalpiaz	Helper
Vermont	June 26-28	Montpelier	F. A. Reid	Windsor
Virginia	June 13	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond 19
Washington	June 26-31	Seattle	J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 26-28	West Liberty	C. R. Singleton	535 Medical Arts Bldg., Charleston 1
Wisconsin	June 12-16	Milwaukee	S. F. Donovan	Tomah
Wyoming	June 19-21	Cheyenne	W. J. Ryan	208 Boyd Bldg., Cheyenne

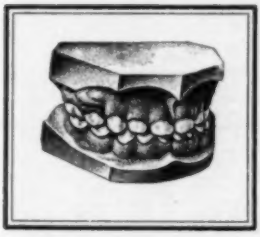
*Dentistry and dental hygiene.
†Dentistry.
‡Dental Hygiene.
§Practical examinations.
**Written examinations.

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
American Dental Assistants Association	Oct. 30-Nov. 2*	Atlantic City, N. J.	M. L. Martin Exec. Secy.	410 First National Bank Bldg., LaPorte, Ind.
American Dental Society of Europe	July 19-22	Amsterdam, Holland	F. D. Derrick	140 Park Lane, London, W. 1.
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 23	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York
American Society of Dentistry for Children	Oct. 27-29	Atlantic City, N. J.	G. Tank Chm.	339 Ashbourne Road, Elkins Park 17, Pa.
American Society of Oral Surgeons, Thirty-Second Annual Meeting	Oct. 25-28	Atlantic City, N. J.	H. Baer Secy.	1112 East Clay St., Richmond 19, Va.
Colorado Dental Foundation, Fourth Annual Seminar in Oral Diagnosis	June 18-22	Colorado Springs, Colo.	B. Ritchey Secy.	629 N. Nevada Ave., Colorado Springs, Colo.
International Dental Federation	July 23-31	Paris, France	M. F. Watry Secy.	35, rue Souveraine, Brussels, Belgium
Italian Medico-Dental Association, Twenty-Fifth Annual Convention on Stomatology	Sept. 26-30	Stresa (Lake Maggiore)	Enrico Goia	Via Lamarmora, 9, Torino, Italy
Mid-Continent Dental Congress, Tenth Annual Meeting	Nov. 26-29	St. Louis	J. E. Brophy Exec. Secy.	927 Syndicate Trust Bldg., St. Louis 1
New England Dental Society, Annual Meeting	Oct. 4-5	Boston	A. R. Wilson Secy.	43 Farmington Ave., Hartford, Conn.
New Orleans Dental Conference	Nov. 5-8	New Orleans	M. R. Matta Secy.	8117 Oak St., New Orleans
Northeastern Society of Orthodontists, Annual Meeting	Nov. 6-7	Washington, D. C.	O. Jacobson Secy.	35 W. 81st St., New York
Pacific Coast Dental Conference	June 25-28 1951	Seattle	C. R. Flood	605 Medical-Dental Bldg., Seattle
Tufts College Dental School, First Annual Berkshire Conference in Periodontology	June 13-17	Eastover, Lenox, Mass.		Berkshire Conference Tufts College Dental School, 136 Harrison Ave., Boston
University of Pennsylvania, School of Dentistry, Second Mid-Atlantic States Seminar in Oral Medicine	Nov. 5-10	Skytop, Pa.	L. W. Burket Director Postgraduate Courses	School of Dentistry, University of Pennsylvania, 4001 Spruce St., Philadelphia 4
University of Washington, School of Dentistry, Graduate and Postgraduate Courses in Orthodontics	Sept. 25	Seattle	W. L. Wylie Director	School of Dentistry, University of Washington, Seattle 5

*Examination for Certification.

2 Outstanding Contributions to Dental Education and Practice



COLUMBIA DENTOFORMS

FROM a humble start 30 years ago Columbia Dentoforms have played an increasingly important role in dental education. Today every dental student in the United States and Canada "cuts" his first teeth on Dentoforms, for we supply Dentoforms to every dental college in the U.S. and Canada and to many in other lands.

In these 30 years there have been many improvements and additions to Dentoforms to meet the ever more exacting demands of teachers. Today Dentoforms number more than a thousand and present conditions the student will encounter in practice. And in graduate years, Dentoforms continue to help clinicians in postgraduate education and to help the busy practitioner in his endless task of patient-education by showing the better dentistry he seeks to give.

BROWN ATTACHMENTS

BROWN Precision Attachments have been used successfully since 1920, when patents were granted to their inventor, Dr. I. Brown. This event followed by only a few years the impetus that Dr. Herman Chayes gave to the advance in removable restorations by the introduction of the precision type of attachment.

So simple, yet so effective and practical are the design and mechanical principles employed in Brown Attachments, that they have defied every effort to improve upon them for 30 years. Except for the addition, about 15 years ago, of the proximal contact type, to give the convenience of a built-in proximal contact, no change in design has been made. The sizes of the Brown Attachment made today are identical with those made 30 years ago — a comforting thought if replacement parts are required.

A New Illustrated Price List is now available. We shall be glad to send you your copy upon request.

Also available on request are 12 Design Charts of Precision Attachment Cases with Descriptive and Technical Literature.

COLUMBIA DENTOFORM CORPORATION

SERVING DENTISTRY FOR OVER 30 YEARS

131 East 23rd Street — New York 10, N. Y.

Atlantic City

HOTELS

Key No.	HOTELS	Single	Double	Suites
37	Ambassador	6.00 - 11.00	9.00 - 14.00	20.00 - 26.00
19	Apollo	4.00 - 6.00	6.00 - 10.00	
21	Boscobel	3.00 - 4.00	6.00 - 7.00	
1	Breakers	5.00 - 9.00	7.00 - 14.00	
27	Brighton	6.00 - 10.00	8.00 - 14.00	18.00 - 28.00
9-10	Chalfonte-Haddon Hall	6.00 - 10.00	8.00 - 18.00	20.00 - 34.00
38	Chelsea	5.25 - 6.75	6.75 - 15.00	21.00 - 28.50
4	Clarendon	5.00 - 6.00	7.00	
28	Claridge	6.00 - 14.00	9.00 - 17.00	30.00 - 31.00
7	Colton Manor	5.00 - 9.00	7.00 - 12.00	
17	Columbus		6.00	
29	Crillon ★		8.00 - 10.00	
33	Dennis	6.00 - 8.00	9.00 - 16.00	27.00
30	Eastbourne		7.50 - 8.00	
16	Flanders	5.00	7.00 - 9.00	
35	Fox Manor	5.00 - 8.00	6.00 - 10.00	
6	Holmhurst		7.00 - 8.00	
23	Jefferson	6.00	7.00 - 10.00	
24	Kentucky	3.50	6.00 - 7.00	
11	Lafayette	5.00 - 6.00	8.00 - 10.00	
18	Lexington	6.00	6.50 - 8.50	
25	Madison	4.50 - 6.00	7.00 - 10.00	
32	Marlborough-Blenheim	6.00 - 10.00	9.00 - 16.00	27.00 - 36.00
15	Mayflower	5.00 - 6.00	7.00 - 12.00	
20	Monticello		7.00	
3	Morton	5.00 - 7.00	7.00 - 10.00	
14	New Belmont	4.00 - 5.00	6.00 - 10.00	
12	Penn-Atlantic		7.00	
40	President	5.00 - 10.00	8.00 - 14.00	13.00 - 24.00
36	Ritz-Carlton	6.00 - 12.00	8.00 - 14.00	30.00
31	Runnymede	4.00 - 7.50	6.00 - 10.00	
2	St. Charles	5.00 - 12.00	7.00 - 14.00	
5	Seaside	5.00 - 9.00	8.00 - 12.00	26.00
13	Senator	4.50 - 7.00	7.00 - 12.00	
34	Shelburne	6.00 - 16.00	9.00 - 18.00	
22	Sterling	4.00 - 5.00	6.00 - 7.00	
8	Strand	4.50 - 6.00	9.00 - 12.00	
26	Traymore	6.00 - 14.00	8.00 - 18.00	16.00 - 40.00
39	Villa D'Este	5.00 - 6.00	8.00 - 9.00	

★Rate includes Breakfast. The above rates are subject to 3% Municipal Tax.

Atlantic City's streets are 13 blocks to the mile instead of the usual 8.

Hotel Reservation Application . . .

91st Annual Session—
American Dental Association
October 30—November 2, 1950
Atlantic City, New Jersey

A. D. A. HOUSING BUREAU

16 Central Pier, Atlantic City, New Jersey

INSTRUCTIONS:

Reservations for hotel accommodations may be secured by completing this application blank and mailing it to: *A.D.A. Housing Bureau,* 16 Central Pier, Atlantic City, New Jersey. List four choices of hotels. You will receive confirmation direct from the hotel accepting the reservation. If any difficulty arises with the reservation, write immediately to the A.D.A. Housing Bureau at Atlantic City.

A.D.A.

Applicant:

Name_____

_____
(Street address) (City) (Zone) (State)

Arrival in Atlantic City_____ a.m. p.m. Leaving_____

Accommodations:

Hotel_____ Hotel_____
(First choice) (Third choice)

Hotel_____ Hotel_____
(Second choice) (Fourth choice)

☐ Single occupancy, rate to range from $_____ to $_____ per day.

☐ Double occupancy, double bed, rate to range from $_____ to $_____ per day.

☐ Double occupancy, twin beds, rate to range from $_____ to $_____ per day.

☐ Suite of _____ rooms, including parlor, rate to range from $_____ to $_____ per day.

Occupants: (use extra sheets for additional names)

Rooms will be occupied by:

_____
(Name) (Address) (City) (State)

_____
(Name) (Address) (City) (State)

It's just good sense!

We could give you a dozen reasons why you should use the Posture Comfort Chair in your practice . . . why you should give your legs and feet a rest . . . why the body support relieves your back, etc. But, in the final analysis, isn't it just good sense to rest your BACK, your LEGS, and your FEET? You can do exactly that AND CONTINUE TO OPERATE EFFICIENTLY, when you use the Posture Comfort Chair. Write today for your copy of the new, illustrated booklet describing the Posture Comfort Chair and this modern way to practice dentistry: Childs Manufacturing Company, 503 Bankers Insurance Building, Macon, Georgia.

Putting the SQUEEZE on infectious bacteria

Aim and squeeze—effective oral prophylaxis is that simple with Abbott's POWDALATOR Insufflator. With this convenient device, penicillin-sulfanilamide powder can be sprayed directly into a post-extraction socket or other wounded surface of the gum. Dual antibacterial action is thus utilized at the site where infection is most likely to occur.

The POWDALATOR Insufflator comes ready for quick assembly: Simply attach disposable insufflator tube to rubber bulb, remove nipple on end of tube. Then—aim and squeeze.

Easy? Try it. Your supplier is amply stocked to meet the growing demand. The POWDALATOR package includes an insufflator bulb and is available with either 20 or 100 sterile sealed glass tubes, each containing 5000 units crystalline penicillin G potassium and 0.25 Gm. sulfanilamide. Abbott

Powdalator® Insufflator

(Abbott's Penicillin Sulfonamide Powder with Sulfanilamide in Insufflator Tubes)

A patient walks in and sits down. First thing she does is look for something to read. There, right in front of her is the new attractive "reason-why" brochure just begging to be read. She picks it up. . . .

When she reaches your dental chair, she is pre-sold on dentistry—the story is told in layman's language. The theme is "The least expensive aid to good appearance is good dentistry." Send for your copies today.

on your next case ... prescribe ..... **Ticonium**
413 N. Pearl Street ..... Albany 1, N. Y.

Write your name and address below and send in for your copies of the three "Reason-why" brochures on patient education.

Name _____

Address _____

City _____ Zone _____ State _____

OUTSIDE IT'S HOT

IN HERE IT'S NOT!

The new Carrier Window Model Room Air Conditioner, available in three sizes. Also a Console Model in three sizes for larger offices and reception rooms.

No matter how stifling the weather outside, a Carrier Room Air Conditioner will keep your office or reception room refreshingly cool. And that's only one of the benefits it gives you and your patients! It lowers humidity, brings in cleaned, filtered air and circulates it uniformly. It also rapidly exhausts stale air, smoke and medicinal odors. Season in and out, it's a real asset.

Men who know air conditioning best designed and built these whisper-quiet, handsome, easy-to-install Carrier Room Air Conditioners. They provide a refreshing atmosphere that patients appreciate . . . prevent perspiration that's so uncomfortable on sticky days . . . eliminate outside dirt to keep furnishings crisp and clean . . . subdue annoying street noises . . . and deliver more comfort per $ than any comparable investment.

Do you want the facts and figures on air conditioning? Just call your Carrier dealer, listed in the Classified Telephone Directory, for a survey of your office. He'll be glad to make one . . . no cost or obligation. Carrier Corporation, Syracuse, New York.

CARRIER ROOM AIR CONDITIONERS
As little as* $34.95 *down

Carrier **AIR CONDITIONING • REFRIGERATION**

MODERN DENTISTRY... *Principles and Practice*

LIPPINCOTT'S HANDBOOK OF DENTAL PRACTICE

Edited by LOUIS I. GROSSMAN, D.D.S., Dr. med. dent. With 18 Contributors.

A new idea in dental references, covering all aspects of dental practice with emphasis on useful technics. "The presentation of the subject matter is very concise; it is remarkable that so much authoritative technical information of current interest and practical value has been assembled and compressed into the pages of the book."—U. S. Quarterly Book List. 1st Edition, 1948. 417 Pages. 306 Illustrations. $12.00.

ORAL MEDICINE

By LESTER W. BURKET, D.D.S., M.D., Professor of Oral Medicine, The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania.

A unique book linking the practice of dentistry and medicine. "This book is comprehensive, well organized, extremely practical, a medical education for the dentist and a veritable source of information for the physician. It is highly recommended."—Journal of the American Medical Association. 1st Edition, 1946. 674 Pages. 350 Illustrations, 10 Color Plates. $12.00.

SUCCESSFUL DENTAL PRACTICE

By J. LEWIS BLASS, Ph.G., D.D.S., Associate Professor of Peridontia, New York University College of Dentistry; and IRVING TULKIN, D.D.S., Postgraduate Instructor on Dental Practice Management, First District Dental Society of New York.

Principles and procedures of assistance to the dentist interested in building and maintaining a successful practice. "Successful Dental Practice is characterized by truth and dignity, and it is unqualifiedly recommended as a major contribution to the betterment of mankind."—Journal of the American Dental Association. 1st Edition, 1947. 221 Pages. Illustrated, including 20 Drawings by Jean McConnell. $5.00.

IN THE DENTIST'S OFFICE

By G. ARCHANNA MORRISON.

Considers the problems confronting the dental assistant, including patient relations, the operating room, and clerical and general office duties. Evaluates methods and technics that have proved valuable in actual use. "This book should serve as a constant reference and a guide for dental office personnel."—Journal of the American Dental Association. 1st Edition, 1948. 424 Pages. 32 Illustrations. $5.00.

J. B. LIPPINCOTT COMPANY • E. Washington Square • Philadelphia 5, Pa.

Please enter my order and send me:

☐ LIPPINCOTT'S HANDBOOK OF DENTAL PRACTICE, Grossman $12.00

☐ ORAL MEDICINE, Burket $12.00

☐ SUCCESSFUL DENTAL PRACTICE, Blass & Tulkin $5.00

☐ IN THE DENTIST'S OFFICE, Morrison $5.00

Name _____

Street _____ ☐ CHARGE MY ACCOUNT

City, Zone, State _____ ☐ CASH ENCLOSED

Meet the

8-INCH STERILIZER TWINS!

I am Model 8-O . . .

a mighty handy and efficient unit that both sterilizes and lubricates with HOT OIL. You will find me unexcelled for dental handpieces, contra-angles, forceps, burrs, chisels, mirrors and the many allied instruments that are subject to rust or corrosive damage if repeatedly exposed to boiling water.

I am Model 8 . . .

a compact and dependable BOILING WATER sterilizer especially suitable for syringes, needles and the many steel surgical instruments the efficiency of which are not impaired by repeated exposure in the medium of boiling water.

Model 8 is ideal for the private home where sterilization of hypodermic syringes and needles employed in the treatment of diabetes and other conditions is required.

TWIN CHARACTERISTICS

- Chamber dimensions 2½ x 3¼ x 8 inches.
- Fabricated of cast bronze, stainless steel and Monel metal, with Fenwal precision thermostatic control unit for accurate temperature maintenance.
- Constructed to permit cover to open full 90° and automatic lifting of instrument tray which may be easily and firmly secured for draining.

Ask your dealer or write us for further information

AMERICAN STERILIZER COMPANY

Erie, Pennsylvania

EVERYBODY SMILE

- **A new dental health education booklet.**
- **Designed for supplementary classroom reading in the upper grades. Also suitable for the dental office reception room.**
- **Illustrated in four colors. Size about 7 by 9 inches. 36 pages.**

EXPERT OPINIONS

"This new booklet, *Everybody Smile*, is the finest piece of health education material I have ever seen, and I mean in all fields of health." Hugo M. Kulstad, D.D.S., Chief, Bureau of Dental Health, California Department of Public Health

"Your new booklet, *Everybody Smile*, is an excellent piece of work. Its colorful art work and text capture the juvenile spirit and attention. I am making such material available to my young patients." Leo J. Shoeny, D.D.S., Chairman, Council on Dental Health, American Dental Association

"It is an attractive and appealing publication and should, I am certain, prove most helpful." Herold C. Hunt, Ed.D., General Superintendent of Schools, Chicago Board of Education

— PRICES —

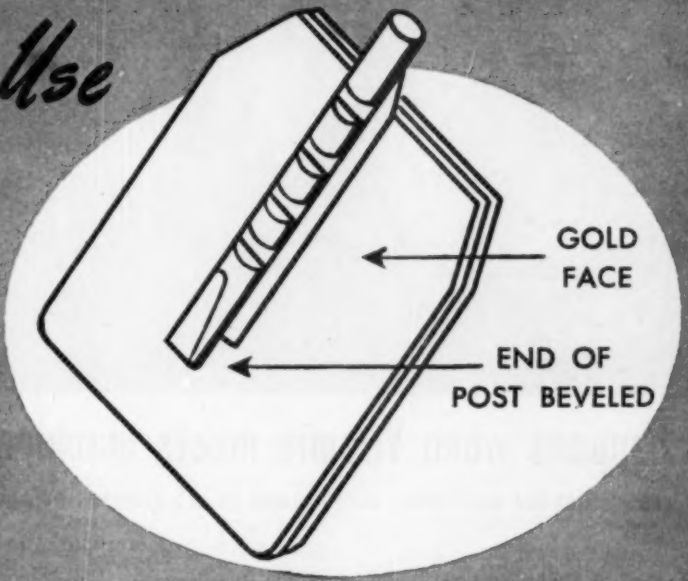
25 copies	**$ 6.50**
50 copies	**11.40**
100 copies	**19.50**

AMERICAN DENTAL ASSOCIATION
222 E. SUPERIOR ST. · CHICAGO 11, ILL.

WITH *Steele's* NEW HUE FLATBACK FACINGS

AND NEW HUE TRUPONTIC TEETH

Use

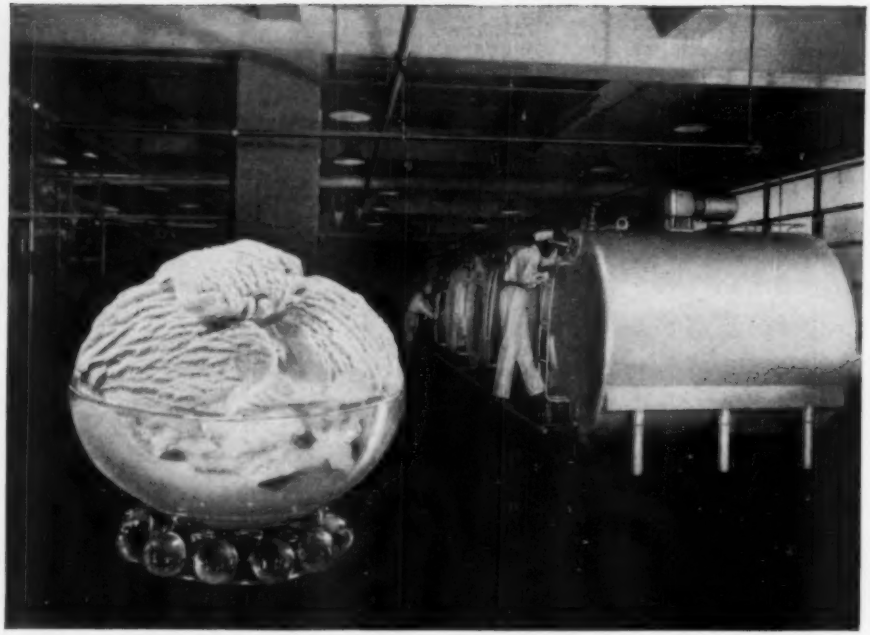


Steele's GŌL-FĀC Backings

They preserve the ORIGINAL shades of New Hue FACINGS and TRUPONTICS and make shade matching easier and more accurate, insuring better esthetics.

CAUTION: When the casting technic is used these Gold Faced backings (like all Steele's backings) require the use of a protective type of investment—such as SUPER-INVESTMENT, made by Ransom & Randolph and available at your supply house.

THE COLUMBUS DENTAL MANUFACTURING COMPANY • COLUMBUS 6, OHIO



What happens when Vitamin meets machine?

Analysis shows that the food value of ice cream is not affected by processing

UNTIL recently, the food value of ice cream was calculated from the total nutrients of its individual ingredients. Calculated values did not rule out the possibility of nutrient losses during processing. In 1948, the first complete *analytical* study of all the nutrients in the finished product was published.* Comparison showed the analytical values to be slightly higher than the calculated ones, in some cases.

Particularly gratifying was the higher vitamin A value brought out by analysis. This was the result of using summer cream in the analyzed samples. However, the figure is thought to be representative, since most ice cream manufactured during the winter is made from summer cream held in frozen storage. This helps insure a product uniform in carotene and vitamin A all year around. Studies show that 84% of the carotene originally present in ice cream remains even after experimental storage for seven months.**

Because its nutrients appear to be little changed during manufacture or storage, ice cream may be depended upon to furnish many of the elements necessary to good nutrition.

*Dahlberg, A. C. and Loosli, J. K. *Nutritive value of commercial ice cream.* J. Am. Diet. Assn. 24:20 (Jan.) 1948.

**Holmes, A. D., Kuzmeski, J. W., and Canavan, F. T. *Stability of vitamins in stored ice cream.* J. Am. Diet. Assn. 22:670 (August) 1946.

National DAIRY COUNCIL
111 North Canal Street, Chicago 6, Illinois

The presence of this seal indicates that all nutrition statements in this advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

Since 1915 . . . the National Dairy Council, a non-profit organization, has been devoted to nutrition research and education to extend the use of dairy products.

TABLETS
BUFFERED
Crystalline
Penicillin G
Potassium

CSC

250,000 UNITS

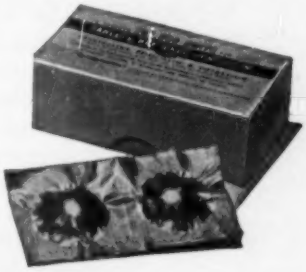
Prophylactically Following Exodontia

In exodontia, the value of prophylactic penicillin administration to patients with rheumatic heart disease or severe infection is well established. Given before and following extraction, penicillin greatly reduces the incidence of blood-borne infection and minimizes the chances for secondary complications both *in situ* and in distant structures.

Tablets Buffered Penicillin-C S.C., providing 250,000 units of potassium penicillin G per tablet, are an excellent means of instituting prophylactic therapy. A single tablet 4 to 6 times daily is usually adequate.

The oral administration of penicillin has also been recommended pre- and postoperatively when there is danger of systemic infection following surgery, especially in the case of infected tonsils, periapical abscesses, etc. For this purpose a minimum of 750,000 units should be given during the 24 hours before operation and 500,000 to 1,000,000 units daily in divided doses every 4 hours after operation for 3 or 4 days.

At your prescription pharmacy in boxes of 10 tablets, each tablet individually sealed in foil.



C.S.C. Pharmaceuticals

A DIVISION OF COMMERCIAL SOLVENTS CORPORATION, 17 EAST 42ND STREET, NEW YORK 17, NEW YORK

RECENT ADDITIONS TO MOTION PICTURE LIBRARY OF AMERICAN DENTAL ASSOCIATION

It's Your Health (16 mm., sound, black and white, 18 min.). The importance of dental health is shown when a star halfback fails his Annapolis dental examination . . . urges and inspires both parent and child to assume the basic responsibility for dental health . . . for upper grade children, parents and teachers. Purchase, Southern California State Dental Association, 903 Crenshaw Blvd., Los Angeles 6, $75. Rent, American Dental Association, $2.50 per day, $4.50 per week.

Your Child's First Visit to the Dentist (16 mm., sound, black and white, 8 min.). Shows two types of conditioning to which a child may be subjected and the resultant behavior in each instance when the child meets up with the reality of dental care . . . for parents. American Dental Association, price—$35; rental—$2.50 per day, $4.50 per week.

Save Those Teeth (16 mm., sound, black and white, 11 min.). Action centers around demonstrations made by Dr. Orfield to Dan, aged 11 . . . proper care involves four principal factors; (1) adequate brushing, (2) proper food, (3) restricted use of sugar, and (4) fluoride treatment . . . for school children, parents and teachers. Purchase, Encyclopaedia Britannica Films Inc., Wilmette, Ill., $50. Rent, American Dental Association, $2.50 per day, $4.50 per week.

Dental Health: How and Why (16 mm., sound, color, 10 min.). By means of a story about Jerry, 12 years old, and Susie, 6 years old, with their family and friends, the "how" and "why" are presented . . . explaining (1) adequate diet, (2) fluoride treatments, (3) daily dental care, and (4) the role of the dentist . . . for school children, parents and teachers. Purchase, Coronet Films, Chicago 1, color $90, black and white $45. Rent, American Dental Association, $2.50 per day, $4.50 per week.

American Dental Association
222 East Superior Street
Chicago 11

1930 Sterilizer

1950 "Space-Maker"

ARE THE DIFFERENCES WORTH 5c A DAY TO YOU

This 1950 "Space-Maker," the first postwar sterilizer, will cost you only 5c a day, figured on part of its useful life. Not only will its beauty give your morale a "lift," but its comparable features will soon repay you. Note these savers:

1930 MODEL	1950 "SPACE-MAKER"
1. Little or no work space on table top.	1. Table top for tray, basin, *and* instruments: saves steps.
2. Sheet metal cover.	2. Attractive cast bronze cover that cuts steaming: less refilling.
3. Manual operation.	3. "Full-automatic" operation, low water cut-off: runs itself.
4. No drawer.	4. Duplex drawer, for instruments, 2 trays, bottle rack: saves time.
5. Limited cabinet space, or none at all.	5. Roomy cabinet, automatically lighted. Rack for table covers—room for tall receptacles: fewer trips to the lab.
6. Hand operated.	6. Foot lift with smooth, quiet oil check: prevents hand contamination.
7. No pilot light.	7. Pilot light visible anywhere in room: saves current.

Ask your dealer if your old sterilizer has trade-in value.

For catalog write: Wilmot Castle Co., 1104 University Ave., Rochester 7, New York.

Castle LIGHTS AND STERILIZERS

Look

INTO YOUR FUTURE
IN THE

U. S. ARMY-
U. S. AIR FORCE

TWO GOOD PLACES TO BEGIN YOUR CAREER IN DENTISTRY

What better opportunity to start your career in dentistry than in the U. S. Army or the U. S. Air Force?

If you are a graduate of an approved dental school you can apply for appointment as a first lieutenant and draw pay of over $5,000 a year—plus free medical and dental care and many other benefits.

This is a chance for you to enter practice without an investment—to earn and save while you accumulate valuable experience. You will enjoy the benefits of the finest clinical materials and equipment.

After one, two, or three years you may return to civilian life, enriched by new skills and concepts, and ready for a more satisfying and successful private practice or, during this period, you can apply for a regular commission.

For further information,
Write:
THE SURGEON GENERAL
UNITED STATES ARMY
OR
THE SURGEON GENERAL
UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

U. S. ARMY MEDICAL DEPARTMENT
U. S. AIR FORCE MEDICAL SERVICE

1900 • PELTON'S GOLDEN JUBILEE • 1950

FRONT PAGE NEWS

The New Pelton

SIGHT-MASTER LIGHT

"BUY IT AND SEE"

Highlight of Pelton's Golden Jubilee is the new Sight-Master Light. Optically and mechanically it is the finest in Pelton's long experience in providing better vision for dentists. Sight-Master projects two converging beams of cool, color-corrected, shadowless light, enabling you to work in your normal operating position. Thus, Sight-Master reduces both eye strain and physical effort. It is low-cost protection for your most valuable asset . . . your eyes.

See it at your dealer's or write for literature.

PELTON

THE PELTON & CRANE CO., DETROIT 2, MICHIGAN

INSURANCE

ACCIDENT • HOSPITAL • SICKNESS
For Dentists, Physicians, Surgeons Exclusively

ALL PREMIUMS COME FROM — PHYSICIANS SURGEONS DENTISTS — ALL CLAIMS GO TO

Cost has never exceeded amounts shown

$5,000.00 ACCIDENTAL DEATH $25.00 weekly indemnity, accident and sickness	**$8.00** Quarterly
$10,000.00 ACCIDENTAL DEATH $50.00 weekly indemnity, accident and sickness	**$16.00** Quarterly
$15,000.00 ACCIDENTAL DEATH $75.00 weekly indemnity, accident and sickness	**$24.00** Quarterly
$20,000.00 ACCIDENTAL DEATH $100.00 weekly indemnity, accident and sickness	**$32.00** Quarterly

Also hospital expense for members, wives and children at small additional cost

85c out of each $1.00 gross income used for members' benefit

$3,500,000.00
INVESTED ASSETS

$16,000,000.00
PAID FOR CLAIMS

$200,000.00 deposited with State of Nebraska for protection of our members

Disability need not be incurred in line of duty—benefits from the beginning day of disability

PHYSICIANS CASUALTY ASSOCIATION
PHYSICIANS HEALTH ASSOCIATION

48 years under the same management

400 FIRST NATIONAL BANK BUILDING — **OMAHA 2, NEBRASKA**

Confidence Breeds Satisfaction

Use of the Dento-Profile Scale provides you with a simple, precise technique that will impress the patient with the matter-of-fact exactness in your routine procedure. Indeed, the exact graphic picture of facial contour, determined with the scale and recorded on an indexed chart, becomes an excellent medium of explanation to the patient. In a manner that can be visualized and understood. he is impressed with the importance of correct pre-extraction dimensions for use in restoring the esthetics and efficient denture function.

The use of pre-extraction records for periodic re-checks will definitely guide you in the restoration of vertical dimensions, which have changed due to resorption and wear, as you rebase or make-over the denture. This will do much to postpone old-age appearance and assure the patient of healthy mouth tissue. It becomes your assurance, from the start, of a patient who will be satisfied with his new denture.

The Dento-Profile Scale is designed for simplicity and accuracy. All facial dimensions, both vertical and horizontal, are read directly in millimeters and noted on the Indexed Record Chart. The Charts, bound in a sturdy loose-leaf binder, become a complete and permanent file on your patients.

The Dento-Profile Scale complete with Binder and Record Charts..... **$15**

EXTRA CHARTS $2. PER HUNDRED

Available thru your dealer, or write

DENTO-PROFILE SCALE COMPANY • **Fond du Lac 3, Wisconsin**

SAVES AT LEAST ⅓ CHAIR TIME . . . ALLEVIATES PAIN

THERM · Ex SPRAY

REG. U.S. PAT. OFF.

by . . . directing its fine atomized, water spray upon bur, diamond and other abrasive instruments.

to . . . abolish frictional heat . . . remove debris from cavity . . . avoid thermal shock . . . eliminate anesthetic in many instances . . . provide clear visibility . . . divert patient's attention.

OPERATED BY PATIENT

Therm · Ex Atomizer fits your spray bottle, and is connected by rubber tubing to spray attachments. Patient presses air cut-off when feeling pain or upon your direction.

OPERATED BY DUAL CONTROL

Equipment becomes integral part of your unit. Synchronized with your engine, spray starts and stops only with foot controller. You may create spray independently of patient, or patient may participate by pressing his hand-switch, or spray may be completely shut off.

Does not flood mouth — saliva ejector unnecessary. No debris ground into tooth structure. Prolongs efficiency of bur, diamond, stone, disc and other abrasives.

Spray attachments quickly snap on or off contra-angle or straight handpiece—are small and uncumbersome — do not interfere with your technique.

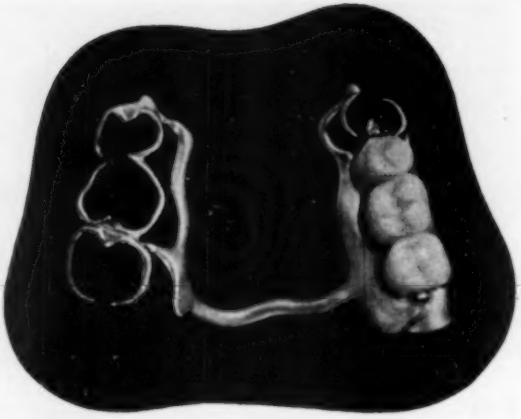
NOTE: Your Therm · Ex Spray may be converted to Dual Control in a matter of minutes by ordering necessary accessories.

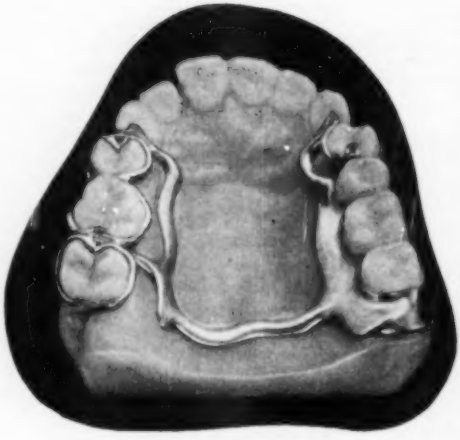
**Full information and illustrated literature from your dealer or by writing Hanau.*

HANAU ENGINEERING COMPANY, INC.

1233 MAIN STREET BUFFALO 8, N. Y.

The Best Prosthetic Skill Can Be Preserved with PLATINUM-PALLADIUM-GOLDS





Restorations made on foundations of precious metals have the strength, hardness and resilience needed to preserve the perfect fit of your work.

Strong, "springy" clasps keep each partial firmly anchored to abutment teeth.

Fitted with comfortable restorations of platinum-palladium-golds, your patients will be proud of their dentures... and of their dentist's skill.

Have you sent for your free copy of the booklet, "PLATINUM-PALLADIUM-GOLDS IN DENTISTRY?" It contains many pages of helpful information.

Platinum Metals Division
THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N.Y.*

Do you remember...

the mobbed showrooms when the Model A Ford was introduced in 1928?

That same year Pepsodent created the slogan

See your dentist twice a year

—a slogan now firmly impressed on the minds of *millions* of Americans because Pepsodent advertising has repeated it *billions* of times!

Pepsodent

Division Lever Brothers Company

Safety First!

NOW . . . REMOTE CONTROL GAS HEATERS ASSURE CLEAR SWITCHES FOR SAFE OPERATION OF TRAINS . . . . .

Latest safety development in railroading is the remote-control gas heater on switches to make sure that ice and snow don't lock the switch in one position. No longer is this vital accident protection left to a bundled up trainman with a lighted torch.

Now . . . a dispatcher from a control point many miles away starts the heaters by turning a control switch. The gas flame quickly melts the ice and snow assuring clear switches even in sub-zero weather!

Amytal

AMERICAN DENTAL ASSOCIATION

Manufactured by the Medicinal Specialties Division of The Merrell-Soule Co., Inc. Accepted by the Council on Dental Therapeutics of the American Dental Association

In a local anesthetic, too...

SAFETY IS THE FIRST CONSIDERATION!

THE SAFETY OF EACH TUBE of Monócaine Local Anesthetic is assured, not by remote control, but by meticulous care in preparation — from deionized, distilled and redistilled water to final animal tests for potency, toxicity, sterility — and, just as important — tissue tolerance.

YES . . . WHEN YOU INJECT an anesthetic solution to bring your patients blessed relief from pain, you want to be sure that you are protecting the health — and very life of the patient — by using a *safe* local anesthetic! Monócaine solution 2ME produces anesthesia as deep as procaine 4%, yet its toxicity is appreciably less than that concentration of procaine.

MONOCAINE

The "Safety First" Local Anesthetic

Formula 2ME

MONÓCAINE 2ME solution produces deep and profound anesthesia of sufficient duration to complete even complicated operations without the necessity of a second injection. Despite its great potency, Monócaine 2ME solution does not prolong the anesthesia unduly with consequent discomfort to the patient.

Assure greater local anesthetic potency without sacrifice of safety . . . specify Formula 2ME!

NOVOCOL CHEMICAL MFG. CO., INC.

2011-23 Atlantic Avenue, Brooklyn, N. Y.

Toronto • London • Buenos Aires • Rio de Janeiro

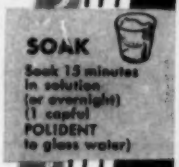
JELENKO GOLDS
Keeping Step with Dentistry through Constant Research
GOLDS of guaranteed physical properties, scientifically formulated to A.D.A. Specifications; Wires and Lingual Bars Immunized against flame oxidation; Calor-Ohmic Heat Treating; Developing positively controlled equipment which made Precision Gold Casting a simple routine — These are a few of Jelenko's epochal steps in keeping pace with dentistry . . .
And we're still stepping!
J. F. JELENKO & CO., INC.
Manufacturers of Dental Golds & Specialties
136 West 52nd St., New York 19, U.S.A.
DR. WILLS' SURVEYOR & ESSENCE
JELENKO PLASTIC PATTERNS
JELENKO "VACUTRON"
JELENKO "TWIN-FLASK" FURNACE
JELENKO "THERMOTRON"
JELENKO "CALOR-OHM-ITRON"

Denture Insurance?

Obviously, you *can't* guarantee that sparkling new dentures will remain natural looking, free from the abrasive damage of harsh brushing, or safe from breakage due to excessive handling by careless patients.

But, you *can* suggest to your patients that they follow the Polident "soak-and-rinse" method, which completely avoids brush damage to delicate ridges, and minimizes handling...yet dissolves away mucin, odor, tarnish, and food debris — leaving dentures fresh and clean.

Such sound advice represents "denture insurance" which your patients will appreciate.



Office samples on request

POLIDENT

HUDSON PRODUCTS, INC., JERSEY CITY 2, N. J.

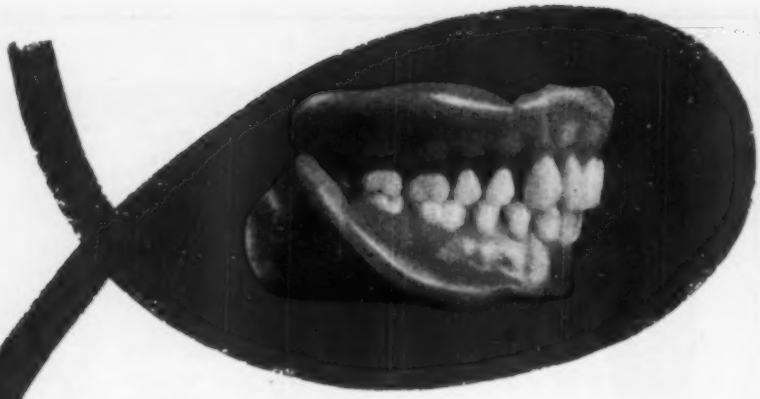
HUDSON PRODUCTS, INC. A-60
JERSEY CITY 2, N. J.

Please send me without charge or obligation a supply of office samples of Polident.

Dr. _____

Address _____

City _____ State _____



FULL DENTURES . . . in every sense of the expression, are a specialty of the CAL-LAB near your office. Dentures that are *complete* in their fulfillment of your requirements for accurate adaptation, designed to displace a minimum oral area and provide ample tongue room, processed with exacting time and temperature controls, finished with a lasting lustre for esthetics and cleanliness. *Full* also in the meaning that "they hold all that they can contain" of the physical properties inherent in your preferred material. For dentures that answer every requisite for strength, hardness, lightness, and life-like appearance . . . for dentures that are in the very pink of condition, call your nearby CAL-LAB today.

CAL-LAB service is backed by CAL-group research and an interchange of knowledge of methods and materials among the CAL laboratories in almost every important city from coast to coast.

Do you read CAL magazine? Ask your CAL-LAB to send it to you!

CERTIFIED AMERICAN LABORATORIES cal SERVICE

REG. U. S. PAT. OFF.

the CAL-LAB Group

* for a trouble-*Free* *Vacation!*

The surest way to have a trouble-free vacation is to have a little extra money along. So let your old scrap take care of at least part of the vacation cost this summer.

Mowrey's have a more than fifty years' reputation for careful grading and assaying. That's why you always get maximum returns for scrap sent to

Mowrey's

* Write for our price list of quality golds and silver filling alloys.

W. E. MOWREY CO.

1899-1950

"More than 50 Years of Service to the Dental Profession"

1436 W. University Ave. St. Paul 4, Minn.

"ORACAM"*-The Complete Dental Photographic Set-Up

For the DENTIST- not the Photographer

YOU CAN USE YOUR OWN 35mm CAMERA WITH THE "OraCam"

Simple — Economical — Efficient

- **FOR INTRA-ORAL PHOTOS**
- For Natural Color Slides
- For Black & White Record Prints
- For Any 35mm Camera
- For Close-ups of Mouth
- For Full Profiles

For Before—After Pictures, Lecture Illustrations, Clinical Observation, Oral Diagnosis, Dental Pathology, and Ceramic Photos.

*PAT. PENDING

FROM MANUFACTURER TO YOU

SAVE $$$$ Full Price $49.50 Delivered Complete

With Argus Model A-2 Camera.....$79.50
With the $59.95 Argus C-3 Camera.....$99.50
Other cameras available.

Just what you've been waiting for! Wait no longer! Underwriters Laboratory Approved. ORDER TODAY — Money-Back Guarantee.

SOUTH SHORE CAMERA CO.

Tel.: BUtterfield 8-8311

1927 East 71st Street Chicago 49, Illinois

SOUTH SHORE CAMERA CO.
1927 E. 71st St., Chicago 49, Ill.

☐ Ship me an "OraCam" for my.....
Make.....Model Camera.

☐ Ship C.O.D ☐ Check Enclosed ☐ Bill me
☐ or, Please send complete illustrated literature.

Dr.....
Address.....
City.....Zone.....State.....

VITALLIUM
Vitallium® partials
ONE OF THE MOST
IMPORTANT DEVELOPMENTS
IN DENTAL PROGRESS
in 50 years

THERE ARE GOOD REASONS WHY

- A BETTER ALLOY
- A BETTER TECHNIQUE
- A BETTER PRACTICE BUILDER

☆ ☆ ☆

PRESCRIBE

VITALLIUM PARTIALS

FOR GREATER PATIENT SATISFACTION

® by Austenal Laboratories, Inc.

LEARN WHY MORE DENTISTS PREFER VITALLIUM REMOVABLES TO ANY OTHER KIND

A-51

a faultless denture

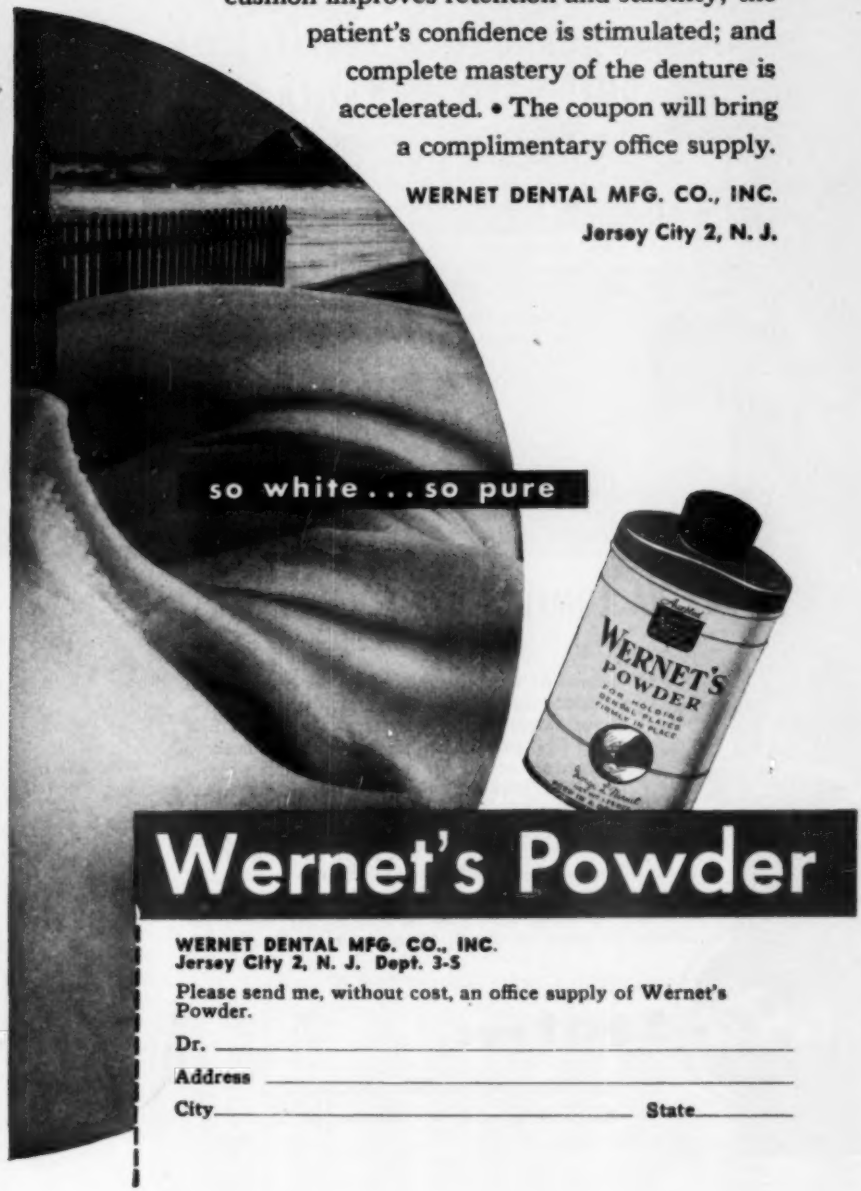
but—

it's no credit to the dentist if kept in the bureau drawer instead of in the patient's mouth. The highest prosthodontic art can be nullified by lack of full patient cooperation—so hard to assure in the presence of anatomical or psychological difficulties. Wernet's Powder, used at the final insertion at the chair and during the first critical weeks

speeds the mastery of the denture . . .

of adaptation, can render real service. Its soft, resilient cushion improves retention and stability; the patient's confidence is stimulated; and complete mastery of the denture is accelerated. • The coupon will bring a complimentary office supply.

WERNET DENTAL MFG. CO., INC.
Jersey City 2, N. J.



Wernet's Powder

WERNET DENTAL MFG. CO., INC.
Jersey City 2, N. J. Dept. 3-5

Please send me, without cost, an office supply of Wernet's Powder.

Dr. _____

Address _____

City _____ State _____

ADD 5 TO 10 YEARS TO YOUR PROFESSIONAL LIFE···PROFITABLY··· COMFORTABLY WITH ROTA-SEAT

Rota-Seat gives you complete operating freedom —SITTING DOWN. It will add years, profitable years, to your professional career, because when you work sitting down you banish exhaustion, backache, bending and twisting stresses that can build up to serious organic disorders. You can take care of more patients, too, for you will need fewer rest periods.

Rota-Seat is the ORIGINAL operating seat for dentists (not merely a rest stool), you sit on deep, foam rubber, and roll easily to any operating position. More and more dental colleges are endorsing Rota-Seat's "sit-down" technique every day—send for fully illustrated booklet showing how to combat fatigue and live longer—the energy-saving, Rota-Seat way.

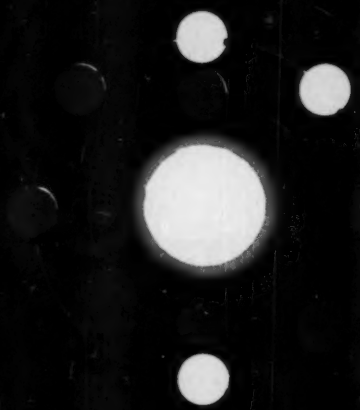
Ask your dental supply dealer to show you how easy it is to operate from a Rota-Seat in *your own* office. Thousands of satisfied users.

EXTRA COMFORT FOR YOUR PATIENTS, TOO . . . .

Instead of the patient holding his head in one position, forcing you to operate from many different, uncomfortable angles, the new Rota-Seat Head Rest permits turning the patient's head to offer easier access for the dentist, thus proving more comfortable for patient and dentist alike. The Rota-Seat Head Rest is adjustable to fit *any* type or make of chair. Made in one piece, large enough to accommodate any size head, of 1¼ in. thick foam rubber, covered with black vinylite to resist acids, water, oil, and all solvents, it can easily be kept clean by ordinary washing. Ask your dental supply dealer for details, or write us direct, giving your dealer's name.

rota-seat INC.

DENTAL EQUIPMENT SPECIALISTS
4606 W. 21st St. Cicero 50, Ill.



molecules locked together!

Acrylic dentures repaired with the NUWELD process are *permanently* repaired... not through adhesion, but through fusion. NUWELD molecules virtually interlock, chemically, with the molecules of the original denture material!

In addition...

NUWELD requires no heat, hence never leads to warpage.

NUWELD acts with certainty and dispatch, saving valuable time in repair and reline operations.

NUWELD closely matches the color of the original denture (available plain and mottled).

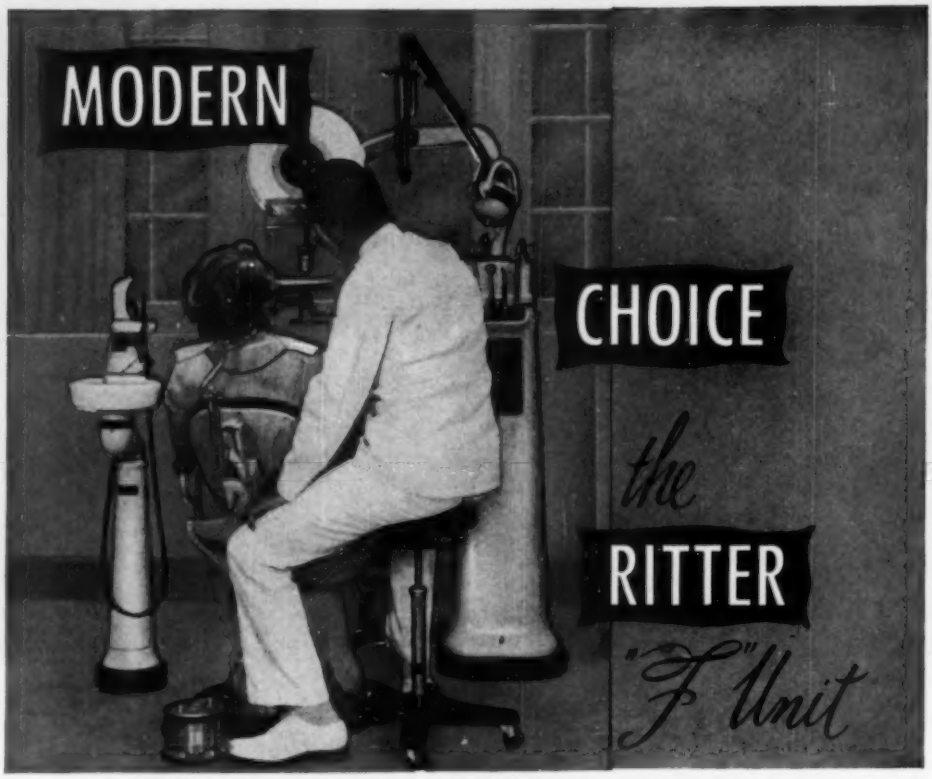
NUWELD resists high temperatures, is unaffected by any chemicals likely to be met in service.

For denture repairing and relining, ask your laboratory to use

NUWELD

Caulk

For modern materials call on CAULK Milford, Delaware



Greater Operating Efficiency With This Modern DIVIDED STYLE Unit

The increasing popularity of the Type "F" Unit with dentists all over the country is due to many popular features . . . no reaching across patients when every instrument is at your finger tips . . . greater freedom of chair rotation, without interference from the unit. For dentists working seated the "F" Unit is ideal with all instruments right at hand. Notice too, the separate, compactly-built cuspidor with built-in aspirator . . . exclusive with the Ritter "F" Unit.

RITTER GIVES YOU A CHOICE OF 2 UNITS . . . Both the Ritter Model "E" and "F" Units give you a complete set of low voltage instruments, angled properly for easy grasp, all within arm's distance. Each unit offers a bracket table in 3 different heights. In each unit, the Ritter Engine gives the greatest range of speeds at the handpiece, 1000-6500 r.p.m. *All regulated by the foot controller.* Both units have the exclusive Ritter Ful-Vue Light with balanced illumination—a concentrated beam for oral cavity work, general illumination for the entire operating area.

AT YOUR DEALERS SELECT THE RITTER UNIT BEST SUITED TO YOUR TECHNIQUE

Ritter
COMPANY INCORPORATED
RITTER PARK, ROCHESTER 3, N.Y.

CO-RE-GA

The Reward of Leadership

is Universal Recognition

COUNCIL on DENTAL THERAPEUTICS
AMERICAN DENTAL ASSOCIATION

CO-RE-GA IS NOT ADVERTISED TO THE PUBLIC

Within the field of denture adhesives CO-RE-GA merits this position because of its strict adherence to quality and ethical procedure.

Mail this coupon for your supply of professional samples

Dr. _____

Address _____

City _____ Zone _____ State _____

CO-RE-GA CHEMICAL COMPANY

208 St. Clair Avenue, N. W. • Cleveland 13, Ohio

THROUGH THE YEARS WITH *S. S. White*

1871
HARRIS
The first all-metal frame chair

1872
MORRISON Long Range
The first chair with compensating seat and backrest

1884
The engine introduced for attachment to the chair ···ancestor of the equipment unit

1899
New model WILKERSON
First chair to give horizontal position

1914
FORSYTH UNIT
First equipment unit

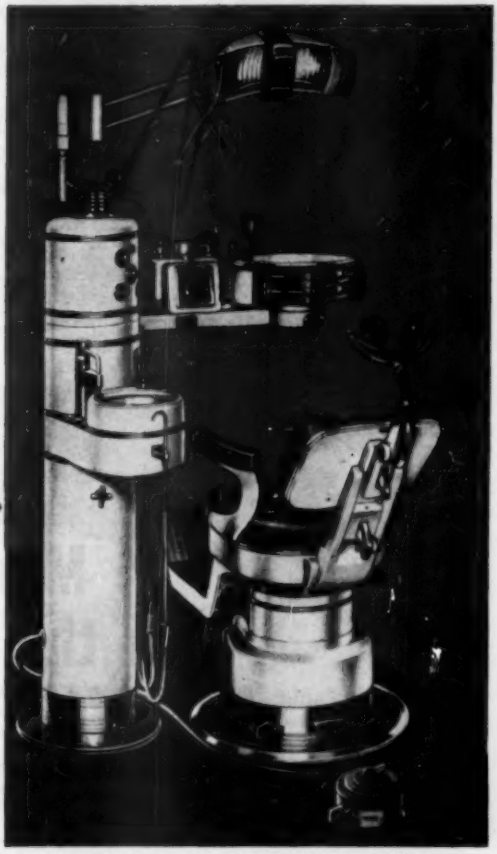
1925
DIAMOND CHAIR No.2
First chair with form-fitting seat and backrest

THE S.S.WHITE

OPERATING EQUIPMENT

1877
WILKERSON
The first hydraulic chair

1908
DIAMOND CHAIR No.1
The first of the famed Diamond Chairs



1928
EQUIPMENT STAND No.6

FOR TODAY and TOMORROW

S.S.WHITE MASTER UNIT AND MOTOR CHAIR

Free office planning service and easy payment terms --- see any distributor of S.S.White Equipment.

DENTAL MFG. CO., 211 South 12th Street, PHILADELPHIA 5, PA.

NOW!

a NEW ECONOMY PACKAGE FOR VOLUME USERS

More Savings with this TOUGHER more ACCURATE Material

Here's a NEW impression powder more accurate than Hydrocolloids! Clinicians teaching Chayes and other precision casting techniques use and recommend it *exclusively*. No tablets, capsules or solutions. USE ORDINARY TAP WATER. 60° to 90° F.

Now in NEW economy, moisture-proof package! $8.00 VALUE FOR ONLY $3.50, for 1 lb. can holding material for 30 to 35 impressions . . . equivalent to 2 boxes! 3 cans $10.00; 12 cans $36.00.

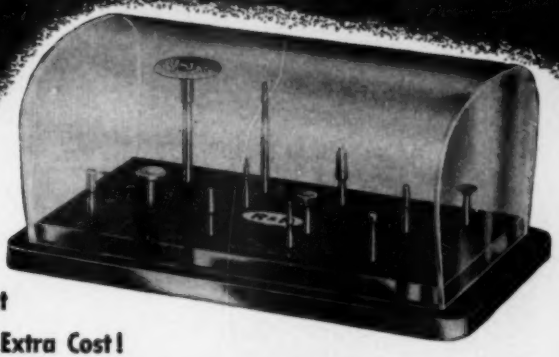
ORDER FROM YOUR DEALER

THE WILLIAM GETZ CORPORATION
DENTAL PRODUCTS
7512 GREENWOOD AVE. • CHICAGO 19, ILLINOIS

A VERSATILE *LOW COST* ASSORTMENT OF CUTWELL *TriBond* DIAMOND INSTRUMENTS ★

★

R&R



. . . Including Attractive Transparent Plastic Case Without Extra Cost!

These Are the Instruments, and Some of Their Uses:

15.. Reducing incisal or occlusal; broadening occlusal cavities; reducing lingual bulge for anterior ¾-crown preparation.

23.. Opening occlusal cavities.

39.. Undercutting.

560.. Extending occlusal cavities.

703.. Extending occlusal cavities; grooves; flaring walls for inlays; slice-lock preparations.

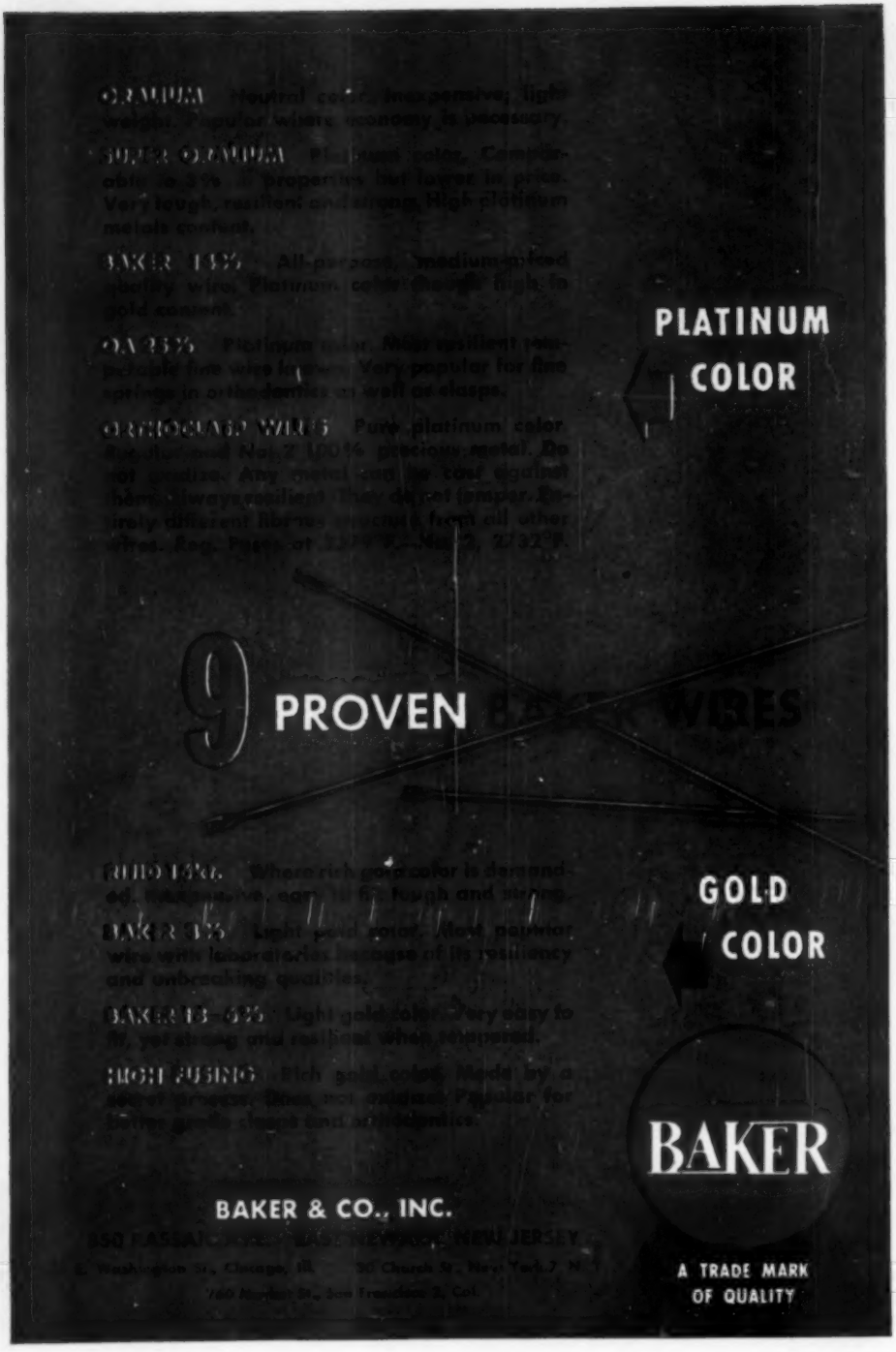
102.. ¾-crown preparation for molars and bicuspids; separating contact points when there are proximal teeth; slice-lock preparations; tapering walls toward occlusal surface for MOD cavities.

TYPES IN STANDARD No. 6 ASSORTMENT

● *Other types may be substituted, if desired, for any of these instruments. Remember that Cutwell Diamond Instruments are unconditionally guaranteed for use on natural teeth.*

★

THE RANSOM & RANDOLPH CO., TOLEDO, OHIO


PLATINUM
COLOR
9 PROVEN
GOLD
COLOR
BAKER
BAKER & CO., INC.
A TRADE MARK
OF QUALITY

THE YEAR BOOK PUBLISHERS, INC., 1900-1950

In its golden anniversary year The Year Book Publishers, Inc. is deeply appreciative of the opportunity to serve the dental and medical professions through the most momentous period of scientific development in world history. Coming years will surely see even more remarkable advances. Year Book Publishers welcomes the privilege to contribute to this progress through publication of authoritative texts and references in keeping with the needs of the times. As such a contribution, we announce

Sarnat and Schour's
ORAL and FACIAL CANCER

The prevention and control of cancer has presented one of the greatest of all challenges to scientific investigation. The significance of the dental practitioner's role in meeting this challenge is appreciated when it is recognized that 15% of all cancers occur in the region of head, neck and oral cavity, and 40% of these cases are first seen by the dentist. Vigilance and knowledge on the part of every practicing dentist is mandatory in cancer control. To meet the growing demand for postgraduate training in early diagnosis and treatment, Drs. Sarnat and Schour have written a book which, in its simplicity, conciseness and minute attention to the basic knowledge and clinical facts, can be only termed unique.

In his Foreword to the book Dr. Andrew C. Ivy, Vice President in Charge of Chicago Professional Colleges of the University of Illinois and Executive Director of the National Advisory Cancer Council, calls it "a successful pioneering accomplishment in the professional field of cancer education." This is definitely a guide to be studied faithfully by every dental practitioner for today, tomorrow, a potential cancer victim may sit in your chair—with death around the corner, unless you are prepared to give the protection that patient trustingly expects. *By Bernard G. Sarnat, M.D., F.A.C.S., Professor and Head of Dept. of Oral and Maxillofacial Surgery, College of Dentistry, University of Illinois; and Isaac Schour, D.D.S., Ph.D., Sc.D., Coordinator of Cancer Instruction, Professor and Head of Dept. of Histology and Associate Dean in Charge of Postgraduate Studies, College of Dentistry, University of Illinois. 304 pages, 236 illustrations on 118 figures, 2 color plates. $6.00, postpaid.*

Limited supply of copies still available of the New 1949 Year Book of Dentistry.

The Year Book Publishers, Inc., 200 East Illinois St., Chicago 11

Please send me the following books, postpaid, for 10 days' free examination.

- ☐ **Sarnat & Schour's Oral and Facial Cancer, $6.00.**
- ☐ **New 1949 Year Book of Dentistry, $5.00.**

Name ..... Street .....

City ..... Zone .... State.....

JADA 6-50

CLASSIFIED ADVERTISING

Forms close on 25th
of second month preceding month of issue

Remittance Must Accompany
Classified Ads.

Advertisements cost $3.50 not exceeding 30 words, additional words 10c each. Commercial agency advertisements, $3.50 for 20 words, additional words 13c each. Publisher reserves the right to determine classification. An extra fee of 25c is charged advertisers who have answers sent care of A.D.A. and in such cases we do not furnish name or address to inquirers. This rate applies for each insertion.

PRACTICES FOR SALE

FOR SALE—Well established practice. Equipment is clean and serviceable. Includes new Weber X-ray. One chair office located in bank building in Iron Mountain, Michigan. Address A.D.A. Box 104.

●

FOR SALE—Complete, Ritter equipped, two chair dental office for general dentistry or periodontia, with large dental hygienist practice. Retiring due to ill health. Only dentist in professional building with thirty-five physicians, in Hartford, Connecticut. Immediate possession. Write Dr. J. Leo Loftus, 50 Farmington Avenue, Hartford 5, Conn.

●

FOR SALE—Fully equipped dental office; college town, central Illinois. Address replies to A.D.A. Box 144.

●

FOR SALE—In Elizabeth, New Jersey. Established practice with completely furnished office, in excellent condition. Includes laboratory, x-ray and McKesson gas machine. Rent below $100 monthly. Full price, $4,000. Address A.D.A. Box 121.

●

FOR SALE—Unusual opportunity. Westchester County, N. Y. Village of 18,000, 35 miles from New York. Leaving to specialize. Established practice with latest equipment and beautiful architectural arrangements. Address A.D.A. Box 141.

●

FOR SALE—Due to death. Florida practice in large city; established twenty years. Excellent location. Complete, modern office, three chairs, air compressor, Castle light and fully equipped laboratory. Address A.D.A. Box 152.

●

FOR SALE—Substantial ten-room home, Eastern Long Island, 2½ baths, automatic heat, slate roof, double garage; eight-room bungalow office, two chairs, Ritter equipped, long established, suitable terms. Consider experienced associate. Address A.D.A. Box 139.

●

FOR SALE—Complete, two chair dental office or any part of office equipment. Located Wintersville, Ohio. GE X-ray, new White J-Unit and motor chair. Old Trident unit and chair. Address Dr. Warren Elliott, Cincinnati General Hospital, Cincinnati, Ohio.

●

FOR SALE—Well established, active general practice; large city, Massachusetts. Central location. Retirement. Address A.D.A. Box 153.

●

FOR SALE—Due to sudden death. Large established practice in Burlington, Vermont. Fully equipped, two chairs, Ritter X-ray, complete laboratory, etc. Excellent opportunity, available at once. Reasonable terms. Mrs. M. R. Machanic, 177 Pearl Street, Burlington, Vt.

FOR SALE—Ritter equipped office of Dr. George G. Starke, Amenia, New York. Reason for selling—ill health. Address inquiries to Dr. Starke, Amenia, N. Y.

●

FOR SALE—Established practice in prosperous small town in Connecticut. Leaving for school to specialize. Will sell to right person at reasonable price. Address A.D.A. Box 154.

●

FOR SALE—Due to illness. Minnesota practice in thriving agricultural community. Located in new building with three physicians. Complete, modern, two chair office. Priced at cost of equipment. Address A.D.A. Box 155.

LOCATIONS AVAILABLE

FOR RENT—Miami, Florida. Completely equipped operating room in new, air-conditioned bungalow office, on Venetian Causeway. Lessee will have use of laboratory, dark room, secretary's office, etc. Address A.D.A. Box 156.

●

DENTAL OFFICE—Available without equipment. Central Illinois college town. Address A.D.A. Box 146.

●

FOR RENT—Unequipped operating room in two-chair suite, new medico-dental building, California suburb, near ocean and city. Experience desirable. May consider association or possible sale. Share general facilities, nurse, etc. Address A.D.A. Box 145.

●

FOR RENT—Dental office adjoining M.D.'s office. First floor, well located and established. Gas, electricity, heat and water furnished. Reasonable terms. Write to H. J. Sliski, 1042 W. Genesee Street, Syracuse, N. Y., or phone Syracuse 3-7755.

OPPORTUNITIES AVAILABLE

WANTED—Young or middle aged dentist for a growing, western North Carolina town and community with a populated area of more than 5,000 where there is no dentist; home and new office provided on a rental basis. Write or contact W. R. Sigmon, Jr., Box 424, Claremont, North Carolina.

●

WANTED—By philanthropic foundation, dentists under 40 years of age for public health work. Starting salary rate $4,500 per annum. Michigan licensure not required, provided the individual is a graduate of an accredited dental school and licensed in another state. For detailed information write Kenneth R. Gibson, D.D.S., M.S.P.H., Director, Child Health Division, Children's Fund of Michigan, 660 Frederick Street, Detroit 2, Michigan.

WANTED—Dentists under forty for State Dental Program. Correctional program for rural elementary school children. Temporary license can be arranged until next meeting of Examining Board. Salary $5,064-$6,072. Modern portable dental equipment or dental trailer furnished. Automobile is necessary. Write State Department of Health, Richmond 19, Virginia.

OPPORTUNITIES WANTED

WANTED—Association with or opportunity to buy dental practice in or near Cincinnati, Ohio. Address A.D.A. Box 157.

●

WANTED—Established dental practice or association for short period with option to purchase practice; in a progressive community in or near Flint, Michigan. Kindly give all details in first letter. Address A.D.A. Box 158.

●

ORTHODONTIST—with two years general practice, now completing two years (full time) graduate Orthodontics, desires a position, association or location **anywhere,** providing an opportunity and a favorable future. Address A.D.A. Box 150.

EQUIPMENT FOR SALE

FOR SALE—Late Weber Model G, Majestic Split Unit, completely refinished in cream white. Also late model GE wall type X-ray refinished in cream white. Both Unit and X-ray are absolutely perfect. Submit your best offer for immediate sale. Address A.D.A. Box 151.

EQUIPMENT WANTED

WANTED—Phillips Inlay Investing Machine in good working order. Manufactured by the Kerr Dental Mfg. Co. Direct replies to Dr. L. W. Creek, Volkmann Bldg., Kankakee, Illinois.

MISCELLANEOUS

WANTED—Old Dental Books—Orthodontia Journals; Old Dental Prints—Advertisements. Leo L. Bruder, 1 DeKalb Avenue, Brooklyn, N. Y.

Burneice Larson, Director
The Medical Bureau
Palmolive Building
Chicago 1, Illinois

OPPORTUNITIES AVAILABLE

(a) General dentist and, also, pedodontists to join dental department, private practice clinic and hospital; present staff consists of seven dentists; winter resort area; Southwest.

●

(b) Oral surgeon to become associated with dentist, well established in Pittsburgh area.

●

(c) Dentist; group appointment; general practice with emphasis on crown and bridge, pedodontics; Ohio.

●

(d) Dentist to become associated with general practitioner; early partnership; New Hampshire.

●

(e) Pedodontist to become associated with several dentists engaged in general practice; Kansas.

●

(f) Dentist to become associated with Chicago dentist; busy general practice.

●

(g) Orthodontist to become associated with orthodontist long established vicinity New York City; partnership possibilities.

●

(h) Associate; general practice of dentistry; early partnership; Ohio.

●

(i) Associate; six-chair office, excellent laboratory facilities; staff includes two hygienists, secretary; salary or percentage, early partnership; Massachusetts.

●

(j) Assistant; general practice of dentistry; two or three years' experience desirable; salary, percentage; eventual partnership; college town, near Chicago.

●

(k) Dentists with teaching experience or graduate training for following departments; oral diagnosis, operative dentistry, crown and bridge, clinical pathology and bacteriology, prosthetics, oral surgery.

(l) Young men with Ph.D., D.D.S or M.D. degrees and competent in teaching gross anatomy, histology, embryology or neuroanatomy; salaries and ranks dependent upon qualifications.

●

(m) Dentist to become associated with dental department, large industrial organization; vicinity Washington, D.C.

●

(n) Dentists with teaching experience or graduate training for following departments: oral diagnosis, operative dentistry, crown and bridge, clinical pathology and bacteriology, prosthetics, oral surgery, children's dentistry.

●

(o) Dentist to direct dental health program in public schools; town of more than 100,000, North Carolina.

●

(p) Michigan-Licensed dentist to take charge of 3-chair dental department associated with group clinic.

●

(q) Dentist to become associated with school health department; opportunity for obtaining excellent training in children's and Public Health dentistry; 5-day week; duties those encountered in any well-regulated private practice; excellently equipped department; Middle West.

PRACTICES FOR SALE

(a) California. Practice limited to oral surgery; well established.

●

(b) General practice; two operating rooms, laboratory, business office; desirable residential area; West Indies.

WANTED—DENTAL HYGIENISTS FOR THE FOLLOWING:

(a) To assist dentist well established in fairly large town near Chicago.

●

(b) Hygienist and also dental x-ray technician; dental department, group clinic and hospital; Southwest.

The Medical Bureau (cont'd)

(c) Dental hygienist of outstanding qualifications to become associated with dentist well established in Milwaukee area; offices recently remodeled and newly equipped.

OPPORTUNITIES WANTED

Young dentist is available for association in general practice of dentistry; graduate of Northwestern; two years' general practice; licensed, Texas, Illinois.

●

Dentist particularly well trained in periodontia; B.S., D.D.S. eastern university; year's dental residency, teaching hospital; graduate training in periodontia; three years' training in general practice before specializing; two years' practice limited to periodontia.

●

Young dentist will be available in Fall for position involving prosthodontia and operative dentistry; B.S., D.D.S., state university; year's dental internship; two years' assistantship with well known prosthodontist.

Wanted—Teaching appointment; B.S., D.D.S., Middle West university; three years assistant professor in operative dentistry and crown and bridge, year's temporary teaching appointment during which time he has conducted graduate course in pedodontics.

●

Pedodontist; D.D.S., Northwestern Dental School; two years' graduate training in children's dentistry; available August.

●

Oral surgeon; B.A., D.D.S., M.S. (Oral Surgery); several years' successful general practice before specializing; eligible for American Board examinations.

●

Young oral surgeon wishes association; B.S., D.D.S., eastern schools; year's internship and two-year residency in oral surgery, teaching hospital.

●

Dentist, now completing year's graduate training consisting of six months in anesthesia and six months in oral surgery, is available; three years' general practice experience.

Woodward Medical Personnel Bureau
185 N. Wabash Avenue
Chicago 1, Illinois

OPPORTUNITIES AVAILABLE

D-134—DENTIST: Young, to complete staff of enterprising Ohio Medical Group: near university center: $400 and partnership in one year.

●

D-138—ORTHODONTIST: Establish individual practice: new clinic building with laboratory facilities. Rapidly growing industrial, farming Westcoast community near university metropolis.

●

D-150—ESTABLISHED DENTIST wants young assistant leading to partnership. Salary to start: Residential community near Chicago.

●

D-139—DENTIST: Associate: brand new, well equipped clinic; private 4-room suite including laboratory, x-ray rooms. Unopposed Midwest agricultural location.

●

D-122—LOCATION for Dentist in California Medical Center, Modern building with 15 Physicians including one dentist at present. Many advantages.

●

D-149—TEACHING APPOINTMENT: Vacancy on University staff School of Dentistry; approved: excellent locality; salary and rank open.

●

D-147—DENTIST: Rapidly developing Southwest Medical Center, all fields of medicine and dentistry covered. 9 dentists Staff: good salary: excellent working conditions.

●

D-146—LOCATION FOR DENTIST: Florida Coast winter resort community. Suite of four rooms, plumbing installed: privately owned hospital.

●

D-123—DENTIST: Hospital and Clinic, ACS approval, Detroit, Michigan area: modern facilities: remuneration 60% of net receipts less laboratory fees.

D-145—DENTIST: Privately owned Midwestern Medical Center, Salary with opportunity for advancement and partnership. Dental group, complete facilities.

PRACTICES FOR SALE

D-142—GENERAL PRACTICE: California resort community; 5 room office fully equipped. Selling due to health.

●

D-148—GENERAL PRACTICE: Florida Coast, established 20 years average yearly income $10,000: price $3,500 with terms. Death of owner.

●

D-141—New Jersey general practice established 15 years, located center of business district: Owner moving to Florida—sacrifice for quick sale: price ½ value of equipment.

TECHNICAL ASSISTANTS

D-145—DENTAL HYGIENIST: to join staff of Privately owned Dental Center. Ideal working conditions, Midwestern location. Excellent opening.

●

D-147—DENTAL HYGIENIST: for staff of Southwestern Medical Center, 18 physicians 9 dentists in group. Wonderful working and living conditions. Unique expanding American community.

OPPORTUNITIES WANTED

ORAL SURGEON: Age 27, D.D.S. State University, internship and residency, P.G. Oral Surgery; wants assistantship, Partnership, or Group Clinic.

Samophen
ANTISEPTIC SOAP
Samophen
ANTISEPTIC SOAP
Recognized by patients Relied on by dentists
*Tested against mixed cultures of Staph. aureus, Strep. hemolyticus and E. coli

A NEW SERVICE

• • • • •

A Quarterly Cumulative
INDEX TO DENTAL LITERATURE
in the English Language

Each issue after the first contains all the material of the preceding issues. A handy reference for everyone who has occasion to refer to dental literature.

Sold on a subscription basis for $30 a year. Send in your order today to

AMERICAN DENTAL ASSOCIATION
222 EAST SUPERIOR STREET, CHICAGO 11, ILLINOIS

Indian Head

GUARANTEED BOILABLE

MOUTH MIRROR

Plane and Magnifying—All Sizes—1 to 6

Cone Socket — $5.50 Doz.
Simple Stem — $4.80 Doz.

Order today. This offer will not be made again

3 Mirrors

FREE

with this coupon only.

Send me the following 15 Mirrors charging me for 12 only.

Doz.... Size... Pl... Mag... CS... SS...

Dr.....

Address.....

Dealer's Name.....

UBECO

UNION BROACH CO., Inc.
37-45 West 20th Street New York 11, N. Y.

"Pre-Carv" PLASTIC BRIDGE RETAINERS

NEW, EFFICIENT and ECONOMICAL UNITS for BETTER BRIDGEWORK RESTORATIONS

Instead of spending hours carving wax patterns, these 3 types of Retainers meet the needs of any restoration. The "H" Type and the Cusp Type are designed for restorations which will employ conventional types of bridge teeth or facings. The Core Type is designed for use where Jacket Crowns are to be employed.

The money saved on time and labor on any one restoration will more than repay the cost of the entire box of Bridge Retainers.

Dentists are enthusiastic in their praise of these units for the convenience they offer, the savings they make possible and the accurate results obtained through their use.

"H" Type

Cusp Type

Core Type

Sold Exclusively Thru Dental Dealers • *Distributed by*

B. G. HATCH COMPANY, INC.

BROOKYLN 1 NEW YORK

MODEL V

With Penta-Prism Eye Level Reflex Viewfinder in Position

For Parallax-Free Dental Photography!

1950 KINE EXAKTA—MODEL V

35 mm. Single Lens Reflex Camera

For photographing conditions before and after treatment, cavities, inlays and bridgework, and for recording and for demonstrating oral treatment to patients. The indispensable aid of the progressive dentist! With f3.5 Zeiss Tessar "T" Coated Lens..... $180.00*
Penta Prism Eye Level Reflex Viewfinder..... 80.00*
Extension Tube Set.. ..... 24.00
Microscope Adaptor..... 24.00
*plus tax

EXAKTA CAMERA COMPANY, INC.
46 West 29th Street
New York 1, N. Y.

MODEL V

Write Dept. 206 For Free Descriptive Booklet "V" on Camera & Accessories And Brochure On Close-Up Technique With Kine Exakta.

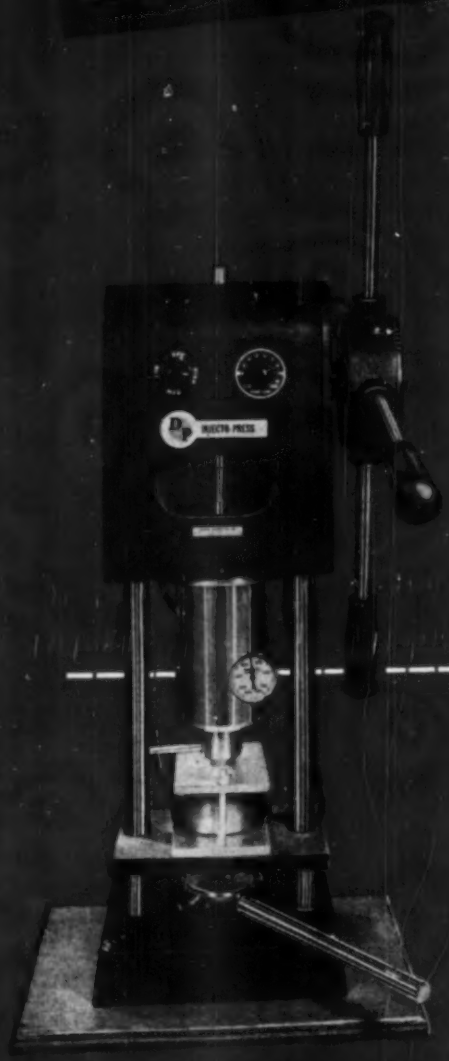
With Waist-Level Reflex Viewfinder in Position

Copyright 1950 Exakta Camera Company, Inc.

New DP Injecto Press

creates
FORM STABLE
dentures with
incredibly lifelike
appearance

No more
porous cases . . .
No danger of post
insertion curing . . .
No more chance of
bite opening . . .



Here's the FIRST
successful adaptation to
Dental use of the
injection processing of
thermoplastic resins. No
wonder it's making
Dental history!

NO POROSITY, WARPAGE OR OPEN BITES

Dentists who make a great effort to obtain fine impressions and who have seen the results of this process are especially enthusiastic over its accuracy. D-P Denture Resin, being fully pre-cured before processing, results in non-porous cases and entirely eliminates the danger of post-insertion curing. Injection of the softened resin under low pressure into a completely closed and locked flask precludes the possibility of bite opening.

D-P DENTURE RESIN ESPECIALLY COMPOUNDED FOR INJECTO PRESS

Softened only by heat, this resin is injected into a completely closed and locked flask with considerably less pressure than used in conventional powder-liquid processing. The soft consistency of the injected resin allows complete adaptation to the most minute detail.

WHY NO PICTURES OF DENTURES?

Because no black and white photograph can possibly do justice to the living tissue-like mottle of dentures made in the D-P Injecto Press! Let your dental laboratory SHOW you one. You'll see what we mean!

JUDGE FOR YOURSELF!

Your laboratory is now equipped to render you this service, or soon will be. Specify that your next case be processed in this manner. Compare the results with *any* previously experienced!

dental perfection co.

543 West Arden Ave., Glendale 3, Calif.

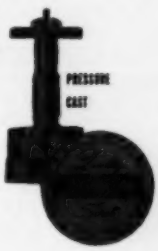
the high "C"
the good

that STAYS a high "C" . . .

There's a good tip for dentists in the reasons for VINYLITE Plastic in microgroove records. Selected *first* for the dimensional stability that assures faithful sound reproduction, VINYLITE Plastic also gives molding accuracy, toughness and resistance to chemicals and water. VINYLITE Plastic gives music lovers a non-warping, practically unbreakable record that plays the same high "C" that was pressed into it for the whole of its long, long life!

fit that STAYS a good fit . . .

For those same reasons—dimensional stability, molding accuracy, toughness, and resistance to chemicals and water, many dentists specify VINYLITE Plastic for dentures. "LUXENE 44," for example, has the dimensional stability in wet or dry conditions that assures lasting mouth comfort. "LUXENE 44" and the Pressure Cast Process give patients a non-warping, practically unbreakable denture that retains its original fit and life-like appearance for the whole of its long, long life!



LUXENE 44* —*of VINYLITE Plastic*
—is the most practical plastic available for dentures to date.

BAKELITE CORPORATION
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
*Registered trade mark

Come into the library!

Come into the libraries of dental schools overseas . . . you'll find that war and poverty made them mockeries . . . a few charred books—some a quarter of a century old . . . and that's all.

Years behind in techniques . . .

Whole new fields unknown . . .

New techniques that we could tell them about . . .

Help through your A. D. A. fund providing new dental books . . . the latest and best technical books for dental institutions overseas . . . sent through CARE.

Won't you help? Send your contribution in any amount to

ADA BOOK FUND

222 East Superior Street, Chicago 11, Illinois

BACK AGAIN!

"Sure — my dentist doesn't hurt!"

NO fear here! But then — why should there be? This young lady *knows* she'll feel no pain. Her dentist—and "N.P.C." —take care of that! ▲ Elimination of dental pain by *any* means is well worth while . . . but what simpler, more economical way than by use of this fine local anesthetic solution? Used where indicated, Novocain-Pontocaine-Cobefrin brings effective relief from dental pain: its deep, dense, lasting action inspires the sort of confidence which makes a trip to the dentist a routine affair. Without this sort of confidence, planned tooth care is hard to achieve; with it, better standards of dental health become an attainable ideal.

COOK-WAITE Laboratories, Inc.
1450 Broadway
New York 18, N. Y.
Cobefrin, Novocain, Pontocaine
Reg. Trademarks Winthrop-Stearns Inc.

npc

"the Difference is Distinctive"

Professional Denture Service Assortment #350
THE TRUBYTE NEW HUE FORM SELECTOR
21 x 6 Trubyte New Hue Teeth
1 x 6 in each of the 21 Trubyte New Hue Forms.
A copy of the booklet "How to Build a Denture Practice" and
A copy of the booklet "Four Easy Steps in the Selection of Teeth"
The album "Professional Denture Service"
A copy of "Trubyte Checking Charts" with its 1001 practice-building suggestions
With Trubyte New Hue Teeth The Appearance of Your Natural Teeth Can Actually Be Duplicated
Professional Denture Service
How To Build
12 x 6 of the 21 x 6 Trubyte New Hue Teeth are in the 12 shades of the Trubyte New Hue Vitality Scale.
Harper Tray
Wawrin Trutype Guide
Trubyte Selection Rim

ANOTHER ETHICAL PRACTICE BUILDER

from

THE DENTISTS' SUPPLY COMPANY OF NEW YORK

Ask your Trubyte Dealer to show you Professional Denture Service Assortment #350. See for yourself how it can help you to increase your denture practice now.